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THE OTTAWA FIELD-NATURALISTS' CLUB
OTTAWA, CANADA

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VOL. LV, No. 1 JANUARY 1941

THE CANADIAN FIELD-NATURALIST

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PUBLISHED BY
OTTAWA FIELD-NATURALISTS' CLUB

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THE OTTAWA FIELD-NATURALISTS' CLUB

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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The Membership Committee of The Ottawa Field-Naturalists' Club is making a special effort to increase the subscription list of *The Canadian Field-Naturalist*. We are, therefore, asking every reader who is truly interested in the wild life of our country to help this magazine to its rightful place among the leading Natural History publications in America.

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The Canadian Field-Naturalist

VOL. LV OTTAWA, CANADA, JANUARY, 1941 No. 1

BIRD NOTES FROM LONDON, ONTARIO

By E. M. S. DALE

THE LAST bird notes from this locality brought the records up to 1933. Since that date a number of interesting observations have been made and several new species added to the list for Middlesex County, while one bird has, we understand, been added also for the Province of Ontario.

The first new county record was Wilson's Phalarope (*Steganopus tricolor*), on May 11, 1934, a female having been observed with other waders in a small pool by the roadside near Putnam. It remained until the next day and was seen by quite a number of the members of the Bird Club.

A little later in the month (May 28) we received word from V. E. Lemon that there were a number of Wilson's Phalaropes in the Dunwich swamp area just east of West Lorne (Elgin County). Eleven birds in all were counted, and, as they were thought to be migrants only, several were collected. As the birds continued in the same locality, however, on the suggestion of Dr. W. E. Saunders, Mr. Lemon organized a party on June 10 to search for a nest. It was discovered by the keen eyes of Allan Webster. A broken egg and a dead young bird were removed and later given to Dr. Saunders. The young bird is now in his collection. Two other young hatched and were running around when the writer went down on June 13 to take photographs of the nest and young. the nest was subsequently collected and deposited in the Royal Ontario Museum of Zoology.[1]

Wilson's Phalaropes continued to come to the same field until 1938 although the colony did not increase in numbers and no other nest or nests were found. No birds were found in 1939 and it is possible they have petered out.

The next new county record was the Double-crested Cormorant (*Phalacrocorax auritis*) on September 28, 1934. On that date Trevor Merriam, who has a farm along the river Thames just below Byron, saw a strange bird sitting on a stone in the river. He shot and the bird flew, but, shooting again, he got it and it turned out to be a Double-crested Cormorant. It is now in the Eli Davis collection.

The third addition was the Western Meadowlark (*Sturnella neglecta*), found seven miles north of London, on April 15, 1936. Dr. W. E. Saunders, the discoverer, has already published an account of this occurrence in *The Canadian Field-Naturalist,* Vol. 51:29, February, 1937, so that details are not now again necessary.

A second record for the Western Meadowlark was made in 1939. On April 15, Roger Hedley, Duncrief, reported that one of his neighbors had a meadowlark with a very unusual song. We went out to see it that very day and it proved to be a Western. We also learned that it had arrived the previous year (1938) about seeding time and had, as well, wintered over, taking shelter in the stable on cold nights. Subsequently, Mr. Hedley told us that it, or a bird with a similar song, had been at his place for a few days in 1937.

On August 5, 1936, Keith Reynolds both saw and heard three Piping Plover (*Charadrius melodus*) flying over near Byron, some five miles west of the City of London. This is the first time this species has been recorded for Middlesex County.

There were two new birds the next year (1937) also, the first a European Widgeon (*Mareca penelope*) at the Ponds on April 4. It was with

1. Baillie, James L., Jr. and Paul Harrington. The Distribution of Breeding Birds in Ontario. Trans. Roy. Can. Inst., Vol. 21, Part 1, Oct., 1936, p. 39.

some Baldpates and was studied with field glasses and telescope for some time.

The sixth addition to the county list was the Tufted Titmouse (*Baeolophus bicolor*), on May 9, 1937. This was reported by Mr. and Mrs. E. H. McKone, who had it under observation for some minutes at quite close range, not far from the city of London.

These additions bring the list for Middlesex County up to 267 species plus 6 subspecies as at December 31, 1939.

The new bird for the Province (Ontario) was the Snowy Egret (*Egretta thula*) one having been seen at Rondeau Park, Kent County, on August 6, 1934. The writer was holidaying for part of the month of August in a cottage at Rondeau and on August 6, Mr. and Mrs. Eli Davis motored down from London to spend the day. When passing the Eau, Mr. Davis scanned it for birds and when he arrived at the house reported a small white heron that he thought was an immature Little Blue. He casually remarked that it was so close that he could see its yellow feet as it walked about, which was all that was necessary to make the rest of those present sit up and take notice. We went up to the Eau almost immediately calling on the way for a number of the members of the Kent Nature Club as well as some of our own club members who were nearby and were fortunate in finding the bird still there and quite unalarmed although between 15 and 20 people were studying it at a range of some 50 to 75 yards. The yellow feet certainly were very much in evidence as it waded about or flew, and as, for a while, it perched on an old stick. It was very active darting hither and thither, snatching up bits of food, sometimes half flying over the water a yard or two as it saw some tempting morsel. It also had a habit of shuffling its feet around in the mud, a trait that is mentioned by Tory Peterson. We could as well easily see the yellow spot between the base of the bill and the eye, another field mark. The bird was gone the next day.

In 1937, about the middle of August, we got a letter from J. H. Smith, Rondeau, stating that three "white herons" had been seen on the creek near his cottage. We went down on August 21 and found the birds as he had stated but they were rather wary and we could not be sure what they were although we thought two, at least, were immature Little Blues. We went on to the Park and returned in an hour to find one of the birds quite near the road. We watched it for some time from the car with field glasses and telescope and were very much pleased to find that it had dark legs and yellow feet, and a yellow spot between the eye and the base of the bill, the field marks of the Snowy Egret.

A. C. Bent (*Life Histories of North American Marsh Birds* 1926), gives three records for this species for Ontario, but we understand from J. L. Baillie, Jr., of the Royal Ontario Museum of Zoology, that these have all since been either discredited or proved incorrect. This will leave the above records as the first for the Province, although, of course, they are only "sight" records, not specimens in hand.

While on the subject of new "records" it might be well to mention the Scarlet Ibis (*Guara rubra*) discovered by Dr. George M. Stirrett[1] of Chatam, at Point Pelee, Essex County, on September 13, 1937. He immediately went to the nearest telephone and called Dr. Saunders at London, with the result that a party was on the way within an hour. By the time we arrived at the Point the bird had moved and was partly hidden as it fed among the reeds so that we could only catch momentary glimpses of it. However, a plane flew over scaring up everything including the Ibis which flew north one-third of a mile to the dike. It circled around, however, and came back alighting in the open where we had every opportunity of studying it with glasses and telescope, with the sun shining full upon it, an occasion of which we took every advantage.

The question that arises, of course, is "Was it a wild bird or did it escape from some zoo?" This will probably never be satisfactorily answered so all we can do is state the facts as we have them. The bird was undoubtedly a Scarlet Ibis, size, color, curved bill, etc., leaving no doubt whatever. The color was a warm salmon, somewhat grayer on the head and neck, and, although one very careful and reliable observer, who saw it on a subsequent occasion, states that as it flew overhead he noticed that one of the black wing tips had apparently been clipped, if such was the case it did not appear to interfere with its flight, at all. Many other southern herons were present at the same time including Black-crowned Night Herons, American Egrets (seven in the field of the glass at once) and several small white ones probably immature Little Blues. The Ibis remained at the Point for some weeks and was seen many times by a number of people.

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[1] Original account by Dr Stirrett on page 13 of this issue.

It is interesting to note that a Scarlet Ibis was reported by Charles A. Urner in *The Season,* for the New York region, in *Bird-Lore,* for November-December, 1937, one having been observed September 5 and 6 at Ridgefield Lakes, Conn., by Ed Sullivan.

While it is only a conjecture, it is possible that the Connecticut bird wandered still farther, finally arriving at Point Pelee one week later. Inquiry at several zoos nearby from which the bird might have escaped did not disclose any missing Ibis.

If a wild bird this would make the initial record of its occurrence in Canada.

We might mention now a few of the interesting observations concerning other species, the first being the Golden Plover, (*Pluvialis dominica*) In the vicinity of London this is one of our very rarest visitors. A flock of about 45 was found by a boy near Delaware on May 5, 1934, and reported to members of the Bird Club who did not, however, manage to get out in time to see them. The report was investigated, though, and there seems to be no reasonable doubt that the birds were Golden Plover the first record for thirty years. A week or two later, and again in May, 1936, a flock or flocks numbering hundreds were seen near Chatham, Kent County.

The Hudsonian Curlew (*Phaeopus hudsonicus*) is one of the rarer migrants inland although flocks are usually seen along the shores of both Lake Erie and Lake Huron towards the end of May each year. On May 24, 1936, Dr. W. E. Saunders saw a flock of 75 to 100 flying over near Delaware, while the following year, on May 22, several flocks totalling in the hundreds were noted flying over at the Ponds. The previous scanty records have been of single birds only.

Since about 1930 the American Egret (*Casmerodius albus*) has been reported fairly regularly each summer, although the numbers vary from year to year. The Little Blue Heron (*Florida caerulea*) however, is of much rarer occurrence. On August 16, 1934, two were noted at Rondeau Park, Kent County, remaining there for several days. On August 18 of the same year four were found near Komoka bridge, ten miles west of London. In 1937, two were seen at Rondeau, on August 21, this time in company with a Snowy Egret. On August 14, 1938, two were found near London, just west of Byron bridge. They remained in this vicinity for several weeks. All were in the immature plumage.

While on the subject of herons it might be well to mention the occurrence of the Black-crowned Night Heron, (*Nycticorax nycticorax*) here in winter. On February 2, 1934, Will Jarmain reported three from the ravine at the west end of Erie Avenue, London, where they were roosting in a hemlock grove. The extremely cold weather (27 below zero on one occasion) closed their customary feeding grounds in the swamps and river, and how they managed to exist was a puzzle until one was captured on one of the city dumps where it had evidently been living on garbage. It was in terrible condition, the feet and legs having been badly frozen. One toe was turned right under the foot and the bird had been walking on it in that position. Efforts to keep it alive failed. When it died it was given to Eli Davis and the skin is now in his collection.

The increasing number of these birds in our vicinity year by year made us feel certain that they were nesting nearby. Rumors of a colony near the Vauxhall bridge, just south-east of the city limits, were investigated in the spring of 1937, by Keith Reynolds, who found some half dozen occupied nests. The Herons have returned each year since and the colony appears to be increasing slightly each season.

The White Pelican (*Pelecanus erythrorhynchos*) is a rare bird in Western Ontario and the following occurrences may, therefore, be of interest. On October 6, 1934, word was received from Dr. C. C. Bell, of Chatham, that he had seen three of these birds at Rondeau, Kent County. One was shot but the others remained in the vicinity for some time and many visited the Eau to see them. History repeated itself in June, 1938, when two more Pelicans came to Rondeau. We went down on June 18, and by following the directions received from Dr. Bell, had no difficulty in locating them.

A pair of Bald Eagles (*Haliaeetus leucocephalus*) were reported as nesting near Komoka in 1919, and since that year it has usually been possible to see one or more of these noble birds in the neighborhood. They raised young several years but during the winter of 1928-1929 the nest blew down and although eagles continued to frequent the vicinity it was not until 1936 that a new nest was commenced. It attained quite a fair size that year while more work was done on it in

1937, but we never learned whether it was actually occupied or not. In 1938, however, eggs were laid and two young eaglets were noted with their heads showing over the edge of the nest on the occasion of the regional gathering of the Federation of Ontario Naturalists on June 4. After being used again by the birds in 1939 the nest once more became too heavy for the branches on which it was resting and it fell, this time becoming lodged, pretty nearly right side up, somewhat lower down in the same tree. It will be interesting to find if the change will affect the use of the nest in 1940.

Harris's Sparrow, (*Zonotrichia querula*) is another very rare bird in Western Ontario. On October 12, 1936, a party was organized to visit Point Pelee, Essex County, and spend the day birding there. Birds were very numerous with a fine flight of hawks including a fine Duck Hawk (*Falco peregrinus*) while sparrows were everywhere in the weedy fields. The find of the day, among the smaller birds, was an immature Harris's Sparrow, spotted by George North of Hamilton. There was evidently a small flight of these birds for A. A. Wood, Strathroy, took two specimens near his home on the same day. The ones taken by Mr. Wood were in Middlesex County and constitute the second record for that district.

A Yellow Rail, (*Coturnicops noveboracensis*) found by Keith Reynolds, on September 6, 1937, a few miles north-west of London, is perhaps worthy of note because it is a very rare bird with us. Another seen by C. G. Watson at the Ponds on May 2, 1939, makes the fourth time this bird has been recorded from our county.

Not many years ago the Whistling Swan, (*Cygnus columbianus*) was considered to be of unusual occurrence, but for some time now it has been reported regularly either during the spring or fall migration from the London district, while the flocks along the lake front at Kingsville are visited annually by naturalists from far and near. We hope this may mean that these fine and spectacular birds are increasing in numbers. The most noteworthy recent visitation of swans to our immediate vicinity occurred on March 23, 1938, when a flock of 200 dropped into Saunders' Pond. We did not hear of them until about 5 p.m. but immediately there was an exodus from the city "pondwards." We were careful not to frighten them so that all who wished might be privileged to witness the rare sight. The next morning we again went to the Ponds arriving at 6.15 just as the vanguard were taking off. The remainder followed shortly after, heading in a south-westerly direction.

The occurrence in Western Ontario of large flights of Blue Geese (*Chen caerulescens*), and Lesser Snow Geese (*Chen hyperborea*) in the fall of 1934, has already been chronicled by other writers. The London district which had previously only been visited by single birds, was favored with part of this movement, several flocks containing both species having been noted October 28, 29, 30. Several hundred birds in all were seen. These two species were again recorded, though in lesser numbers, in October, 1936 and October, 1937.

One of the birds that occasionally wanders from the beaten path is the Arkansas Kingbird, (*Tyrannus verticalis*). We have been on the watch for it near London, especially since it was reported from both Point Pelee and Hamilton in the spring of 1937. On October 1, 1939, our search was rewarded very unexpectedly. We had gone down to the "hawk cliff" at Lake Erie but being an off day for raptores we started for home along the lake shore road stopping now and again to look over the sparrows and other birds by the roadside. About a mile east of Port Stanley, our attention was drawn to a bird sitting on the fence some hundred yards from the road. Being unable to identify it from the car we stopped and approached it on foot across the field. Before long our suspicions that it was an Arkansas Kingbird were realized. The bird was most accommodating, allowing us to come with close range, while the opportunity of observing it as it used the wire fence as a point from which to sally into the air after insects, could scarcely be improved upon. Unfortunately it was in Elgin County, not Middlesex, but nevertheless it was a most interesting find.

While a great deal has yet to be learned about some of the commonest of our birds, it is the search for and occasional finding of the rare and unusual ones that lends zest to the hobby and keeps the interest from flagging.

BIRD VISITORS AT RED DEER, ALBERTA

By MINA P. COLE

AMONG the birds visiting at our feeding station in recent months were two species not previously observed in this locality and one species which had been noticed here only once before.

Cold weather in early October (1939) and later a twelve-inch fall of snow brought a number of storm-stayed migrants to our doors. The Slate-colored Juncos (*Junco hyemalis*) which belong here, were joined by a small flock of the more brightly coloured Oregon Juncos (*Junco oreganus*). With them were a few Song Sparrows (*Melospiza melodia*), about a dozen White-crowned Sparrows (*Zonotrichia leucophrys*) and three strange birds, larger than the White-crowns, darker about the head, but very similar except for the crowns, which were black, striped with dull gold. The three visitors, soon identified as Golden-Crowned Sparrows (*Zonotrichia coronata*), were very active and aggressive, could run swiftly, scratch like hens, and often they drove the House Sparrows right away from the feeding place. They were less slender than the White-crowns, and much less retiring in behaviour. The whole flock left early in October.

By that time another visitor had arrived, an odd bird looking like a cross between a Meadow lark and a Robin, but well-shaped and beautifully coloured. The back was robin-brown with points of blue, and the breast warm-peach with a dark necklet on the upper breast. Over the eye was a yellow stripe matched by spots and bars toward the wing-tips. The bill was dark and the legs light-coloured. As it fed on fruit bushes about eight feet from a window the markings and colours could be accurately noted, and we were able to identify the bird as a male Varied Thrush (*Ixoreus naevius*), a species not previously observed in this district even by Mr. F. Farley.

As the bird actually danced for its dinner it proved an interesting and entertaining visitor during ten cold, snowy days of its sojourn with us. It fed chiefly on the frozen black currants hanging from the big ornamental currant bushes near the door, and secured the fruit by jumping at it from the ground. If unsuccessful, the hungry bird tried again and again, springing from fifteen to thirty inches from the ground. The observer later on helped by picking handfuls of currants to scatter on the ground so that the thrush would have sufficient food. Later on he took scraps, and even drove the Blue Jays from their corn, which he tried to eat. It is probable that when he left he travelled with a small flock of Robins which had remained in town after the storm.

The next interesting visitor, a Brown Creeper (*Certhia familiaris*) arrived on January 18th. It is still with us, enjoying scraps and suet put out for Chickadees. This specimen is very gray like a spruce trunk, his head thin and very pointed, ending in a bill like a spruce needle. When flattened against a spruce trunk he resembles a powder puff. The tail is long, thin, and notched, while the claws are much longer than one would expect. He was very shy at first, but, though driven away by all the other birds he was very persistent in returning at every possible opportunity. Now he will feed when the observer stands at a distance of eight feet. While gathering tiny scraps of food he makes a noise something like the weakest call note of a Chickadee.

Other regular visitors at the feeding station this year are: five Blue Jays (*Cyanocitta cristata*), three Magpies (*Pica hudsonica*) two Downies and two Hairy Woodpeckers (*Dryobates pubescens* and *D.villosus*), about ten Chickadees and forty House Sparrows (*Passer domesticus*). Flocks of White-winged Crossbills (*Loxia leucoptera*) Bohemian Waxwings (*Bombycilla garrula*), Common Redpolls (*Acanthis linaria*), Evening and Pine Grosbeaks (*Hesperiphona vespertina* and *Pinicola enucleator*) frequent the trees on the lot, where they find spruce seeds, keys of Manitoba maple, dried saskatoons and fruits of the wolf berry and rose, as well as seeds of weeds and of the swamp birch.

Miss Margaret Dixon, Penhold, Alberta, reports that Violet-green Swallows (*Tachycineta thalassima*) returned again to Horn Hill, to last year's nesting boxes. One pair came a half-mile down the road to her yard, where there are many nesting boxes. They nested and a clutch of eggs was laid. These were soon found on the ground, having been pierced and thrown out by Wrens. Another attempt failed, after which the little swallows went away. A similar fate overtook the nests in Robin Dixon's boxes higher up on the hill.

SIXTY-SECOND ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB

REPORT OF COUNCIL

MEETINGS. During the year there were two council meetings. The first was held at the home of Mr. and Mrs. Hoyes Lloyd on January 3, 1940, with an attendance of eleven, and the second at the home of Mr. and Mrs. H. G. Crawford on November 19, 1940 with an attendance of fifteen.

EXCURSIONS COMMITTEE. A committee meeting was held early in the year at the home of Mr. and Mrs. H. Groh, when excursions for the spring months were arranged; and another on November 25 at St. Patrick's College to outline a winter programme.

Three lectures since last report were held at St. Patrick's College, and one on March 21 at the National Research Council, with attendance averaging about 30.

January 18 — The Honey Bee—How She Lives and Works; illustrated by reels of pictures—Mr. C. B. Gooderham.

February 15 — Popular Astronomy, with slides, Mr. Malcolm M. Thomson. This was a joint meeting with the Royal Astronomical Society, members of which afterwards directed observations of the heavens through telescopes.

March 21 — Religion of the North American Indian, with slides, Dr. Diamond Jenness.

April 18 — An account of the Sister Dominion of South Africa and its Natural History, illustrated, Miss M. P. Sargeant. Films of the Ottawa District Wild Flowers were also shown by courtesy of Mr. F. R. Crawley.

Excursions were held as follows with an average attendance of about 40:

April 27 — Hog's Back.

May 4—Base Line Quarries and McKay Lake.

May 11 — Britannia.

May 18 — Fairy Lake.

June 1 — Kingsmere, Sky Line Trail.

June 22 — Mer Bleue Peat Bog, Carlsbad Springs.

The Committee's receipts from excursion tickets just about met expenditures incurred during the year. These receipts were $9.00, and an advance of $10.00 was received from the Club Treasurer. Expenditures on notices of meetings and excursions and operation of Research Council lantern were $7.40, and deficits on two chartered bus trips were $2.25, a total of $9.65, leaving a balance of $9.35 returned to the Club Treasurer. This less favourable result than in some years has resulted from a reduction of ticket holders to 9.

PUBLICATIONS COMMITTEE. The Committee has issued the Canadian Field-Naturalist with its usual standard of good original material. The publishing of this journal is a costly enterprise and therefore the support of the Club through membership will ensure the continued success of this publication.

LECTURES COMMITTEE. The Annual Meeting of the Club on December 5, 1939, was addressed by Professor V. C. Wynne-Edwards of the Biology Dept. of McGill University, who presented a very interesting account of the flora in the mountains of Quebec and Labrador. His lecture was accompanied with coloured slides.

Council had decided that due to the war there would be no Annual Lecture as had been customary during the past few years.

Monthly lectures were planned and conducted as usual by the Excursions Committee as set forth elsewhere in this report.

BIRD CENSUS. The local bird census was taken on December 24, 1939, with 15 persons taking part. There were 16 species and 1,280 individual birds reported. The comparative scarcity of birds that this report indicates is believed to have been due to a severe storm of freezing rain that occurred in this vicinity five days before the census was taken. The census report was published by both "The Canadian Field-Naturalist" and "Bird-Lore" and a news item based on it was furnished to the Canadian Press.

INTERNATIONAL COMMITTEE FOR THE PROTECTION OF BIRDS OF THE WORLD. Dr. H. F. Lewis and Mr. Hoyes Lloyd were representatives. Mr. Lloyd was vice-president of this committee during 1940.

MACOUN STUDY GROUP. During the winter of 1940 a group, called the Macoun Study Group, was organized for study in the various fields of natural

history. It met monthly in the Motor Building which was made available through the generosity of the Dept. of Mines and Resources.

ACKNOWLEDGMENTS. The Council of 1940 wishes at this opportunity to express its appreciation of the work and co-operation of many of its members. Council wishes to thank all the leaders of excursions and lecturers throughout the year, and also, the authorities of St. Patrick's College who generously supplied accommodation for the winter lectures.

During the year the Club has received donations of early numbers of the "Naturalist". These were gratefully received. Donations of this kind are very useful in filling out complete sets of the "Naturalist".

Your Council has endeavored to work for the best interests of the Club, and hopes that the results meet with your approval.

In retiring from office this Council wishes to extend to the incoming Council every best wish for the continued success of the Club, both financially and scientifically.

C. R. LOUNSBURY,
Secretary.

STATEMENT OF FINANCIAL STANDING
OTTAWA FIELD-NATURALISTS' CLUB, DECEMBER 10, 1940
CURRENT ACCOUNT

ASSETS		LIABILITIES	
Balance in Bank, December 10, 1940	$ 69.94	Reserve Fund	$ 114.52
Bills receivable	224.77	Balance	180.19
	$294.71		294.71

RECEIPTS		EXPENDITURES	
Balance in Bank, November 30, 1939	$ 38.48	Printing and mailing The Canadian Field-Naturalist, 8 numbers	$ 766.82
Fees—Current	655.89	Editor's Honorarium	50.00
" —Advance, etc.	61.10	Postage and Stationery	32.23
Separates	29.59	Separates	37.22
Illustrations	28.25	Illustrations	96.00
Single and back numbers	26.95	Bank discount	21.04
Miscellaneous	140.72	Miscellaneous	22.25
Loan from Reserve	114.52	Balance in Bank, December 10, 1940	69.94
	$1095.50		$1095.50

WILMOT LLOYD, Treasurer.

Audited and found correct
December 10, 1940.
HARRISON F. LEWIS, W. H. LANCELEY, Auditors.

STATEMENT—RESERVE FUND

ASSETS		LIABILITIES
Canadian Government Bonds	$1200.00	NIL—
Balance in Bank, December 6, 1940	200.47	
	$1400.47	

RECEIPTS		EXPENDITURES	
Balance in Bank, November 30, 1939	$ 310.99	Bond Interest to Current Account	$ 54.00
Bond Interest	54.00	Loan to Current Account	114.52
Bank Interest	4.00	Balance in Bank, December 6, 1940	$200.47
	$368.99		$368.99

EDWARD F. G. WHITE, Chairman,
Reserve Fund Committee.
WILMOT LLOYD, Treasurer.

Audited and found correct
December 10, 1940,
HARRISON F. LEWIS, W. H. LANCELEY, Auditors.

STATEMENT—PUBLICATION FUND

ASSETS	
Canadian Government Bonds	$900.00
Balance in Bank, December 6, 1940	172.20
	$1072.20

LIABILITIES

NIL—

RECEIPTS	
Balance in Bank, November 30, 1939	$169.52
Bond Interest	39.50
Bank Interest	2.68
	$211.70

EXPENDITURES	
Bond Int. to Current Account	39.50
Balance in Bank, December 6, 1940	172.20
	$211.70

WILMOT LLOYD, Treasurer.

Audited and found correct.
December 10, 1940.
HARRISON F. LEWIS,
W. H. LANCELEY,
Auditors.

BOOK REVIEWS

A FIELD KEY TO OUR COMMON BIRDS, *by Irene T. Rorimer, Illustrated in line and color by Roger Tory Peterson. Pocket Natural History No. 8, Zoological Series No. 3, Cleveland Museum of Natural History, Cleveland, Ohio, 1940. Price $1.50.*

A most compact and, in form, a most usable little volume in flexible, waterproof, flush-trimmed covers that just fits the pocket and will stand all kinds of rough field wear and tear. Typographically it is practically perfect, and beautifully illustrated in both color and black and white by the clear and charming diagramatic and naturalistic sketches by the gifted artist. It has no life history or specific comments. The descriptions are clear, untechnical and direct. The only criticism this reviewer has to offer is that the "Keys" are based largely upon the normal habitat of the species diagnosed. With the great mobility of birds and the number of times and occasions they stray out of normal habitat, it can be questioned whether such a general classification is as workable to the amateur as other more positive distinctions. Without doubt a beginner might have considerable difficulty in attempting to identify a new bird through this key if it occurred in an even slightly unusual locality.—P.A.T.

INTRODUCING INSECTS *by James G. Needham; Jaques Cattell Press, Lancaster, Pa., 1940; pp. 123, illustrated, $1.50.*

The author of this little book, professor emeritus of entomology at Cornell University, continues to show himself a man of parts. A leader in the field of aquatic entomology and limnology, writer of a text-book of biology, and a treatise on natural history for farmers, Dr. Needham now offers an introduction to entomology for laymen and beginners. In this book, a smaller counterpart of Lutz's fine "Field Book of Insects," he is eminently successful.

Choosing the points of contact at which the layman becomes aware of entomology, the author elaborates each topic, anticipating each succeeding question and leading the reader on to further enquiry and active interest. In contrast to similar works of European origin, more attention is paid to the practical problems which insects cause,—or economic entomology. The text is aptly illuminated by many line drawings and the book is of attractive size, shape and format. Many Canadian readers would find it useful and interesting; one cannot help but wonder if the publication facilities afford it the circulation it deserves.—A.W.A.B.

CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(*Continued from page 136*)

Thurs. 26. Left at the usual hour. It rained last night slightly. Made a decharge at the Escape Rapid and at two of the Sandhill Rapids, but ran the others with whole ladings; all these rapids are strong and long. 2 barren does were shot today in the water, one by Mr. Stewart, the other by E. Kippling; 2 or 3 others were seen, and immense numbers of Canada geese—64 of them were killed in the "runs" ashore. An ermine[155] (*July,* 1855—*THLEWYCHO RIVER*—46) and beaver mouse were also killed at Escape Rapid and here. We encamped above Wolfe Rapids. A cache of 1 bag flour, 1 bag pemmican and a case of tea, &c—at the head of Escape Rapids. Some old Esquimaux marks and encampments were seen at Escape Rapid.

Friday 27th. ⅓ this day nearly was lost by our mistaking a channel of the River which led us into a deep bay at the bottom of which was a small river.[156] It appears to be frequented by the Esquimaux. This occurred above Mt. Meadowbank. It was blowing a tempest with rain which prevented the steersman from observing the current in this lake-like expansion of the River. The Wolfe and 9 other rapids were run with whole cargoes; they are all strong, some with whirlpools which must be dangerous in high water. 2 large bands of Musk Oxen were seen just before encamping, 2 or 3 deer, 3 wolves, many Canada geese and a hawk.[157] We encamped late about 3 miles below the Rapid with whirlpools and Esq. marks. A cache of 1 bag pem'n and 2 nets was made at a bold point at the bend of the river above Mt. Meadowbank.

(I was nearly upset by the canoe grazing a stone. It was only a shave—the gum only was rubbed off.)

July, 1855—THLEWYCHO RIVER—47

Sat. 28th. Left at the usual hour. The day was fine which gave us an opportunity of drying our clothes while breakfasting, only to be wetted again by the spray arising from a strong head wind, which retarded us very much. 4 rapids were run, 3 of them very strong. The eddies or whirlpools strain the canoes very much; we cannot keep them tight—they are evidently getting shaky. 2 plovers were seen and immense numbers of Canada geese were seen—20 were killed. 2 deer were also seen close (does) one of them had a fawn with a leg broken, but the little creature managed to ascend a steep and rugged mountain pretty swiftly on 3 legs. Some good sized willows were gathered. Extensive patches of snow on the right bank of the River. We encamped late a little above Montresor River.

Sund. 29th. Left early. Ran a bad rapid above Montresor River, in which Mr. Stewart's canoe was completely ungummed. We were consequently obliged to put on shore at 6 o'clock to gum where we breakfasted likewise and made a cache of 1 Bag Pem'n and 1 bag flour. The rapid at McKay's Peak was little more than a strong current. In the rapid below it, my canoe was nearly broken. Tho' it was an easy one we had to contend against a strong head wind all day; in the evening this was accompanied by a soaking Scotch mist. This compelled me to encamp—in case I should miss my road—at 7 p.m. near the (*July,* 1855—*THLEWYCHO RIVER*—48) outlet of Franklin Lake. Esquimaux marks numerous and traces fresh. Saw Esquimaux ducks;[158] no animals were seen, but abundance of Canadian geese of which 53 were killed at one run—they are beginning to fly. Montresor River has a rapid at its mouth; it does not appear a large river at present. 2 small black-headed gulls[159] attacked us at the encampment, even striking at our hats.

Mond. 30th. Left early. The rapids at the outlet of L. Franklin were partly passed by a portage and partly run. At their foot we saw 3 Esq. Lodges, in which were an elderly man, 3 women and a host of children, the others being absent.[160]

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155. Weasel, probably *Mustela arctica* (R.M.A.)

156. Probably Meadowbank River, shown on Northwest Territories map Sheet No. 2, Department of the Interior, 1933 (M.G.C.)

157. Possibly a Duck Hawk, *Falco peregrinus,* a species frequently seen in this region, especially around rapids and bold points. (P.A.T.)

158. Eiders; as they are near the sea they may be King Eiders or Common Eiders, *Somateria mollissima.* (P.A.T.)

159. Sabine's Gull, *Xema sabini.* (P.A.T.).

160. Anderson has now reached another Eskimo tribe the Utkuhikhaligmiut, or Potstone Eskimo, who occupied the region round the mouth of Back River. (D.J.)

Large numbers of W. Fish and Trout[161] were hung out to dry, as well as some deer meat. The lodges were made of Musk Ox skins dressed with the hair inwards. These people made us understand that a party of white men had starved to death (at the sea) after their vessels were destroyed—2 of Dr. Rae's men understand many words and phrases. In their lodges were copper and tin kettles both round and of a square form—longer than broad—evidently belonging to cooking stoves. Various pieces of wood poles and boards of ash, oak, white pine, and mahogany were (On an island below the falls found the head of a blacksmith's tongs, the handles broken off.) (*July*, 1855—*THLEWYCHO RIVER*—49) about the lodges, also a brass letter clip, but nothing to identify any person. Some of the boards were painted white. Nothing could be learned about books or manuscripts—the absence of the interpreters is a sad blow to us. We ran the last falls—they were only an easy rapid at this stage of the water. At some distance below this we saw two cyaks, but they turned tail immediately on seeing us and joined 3 others on shore. 2 finally took courage (one on old, the other a young man) to cross to us, but we learnt nothing additional from them—they confirmed the accounts given by the others of the death of the crews of the vessels, etc. The weather has been most gloomy and the wind ahead, with occasional showers; about 5 it commenced raining in earnest and insreased to such a degree that I gave the order to encamp, but we could find no fit place till 7¼ p.m. when we disembarked thoroughly soaked. No fires could be made so that Pem'n and cold water was the order of the day. Some spirits should be provided for an expedition of this kind—the men really require it on such occasions as this. A little before encamping saw a small band of deer in a bay; Canada geese were also numerous. Encamped among the islands about half way between the Fall and Victoria Headland.

Tea this evening 31 t to men.

July, 1855, MOUTH THLEWYCHO RIVER—50

Tuesd. 31st. The rain prevented us from leaving before 5½ a.m. It recommenced just after embarking and we had a wretched time of it till we reached Victoria Headland to breakfast at 11 a.m.; it then partially cleared up, but we had occasional showers with fog till we encamped at 8 p.m. at Pt. Beaufort. Red granites is the prevailing rock at all the points at this side of the inlet. Vict. Headland is principally composed of hills of rounded stones like shingles, though I believe them to be only decomposed rocks. Willows were found at the waterfall at Vict. Headland[162]— fuel of 2 kinds in small quantities and most of the flowers we saw inland. No animals were seen today nor any traces of any—except a wolf and 2 seals,[163] the latter below Victoria Headland—there is no such thing as a deer pass or any place where even an Esquimaux could live. We have seen no marks this afternoon. At this encampment I found all the "agrets" of an Esquimaux, most of them of deer-horn, and a few of iron; one had holes evidently drilled by a tradesman. There was also a piece of tin. I suspect they belonged to a dead man—they must have been here some time as they were in a state of decay. Bands of Canada geese seen this evening, also Esq. ducks, a loon and a large gull. Noticed the tide at Victoria Headland.

Wed. Aug. 1. Detained by wind and rain till 2½ p.m. (*August*, 1855 — *Montreal Island* — 51—) The wind was from the S.W. and has doubtless cleared away some of the ice. We took the Traverse to Montreal Island and with the aid of the paddle made it in 3 hours. We lost some time among drift ice, driving very rapidly with wind and tide from Elliot's Bay. We had some narrow escapes and I was heartily glad to get safe through it. This is 6 or 7 feet thick and perfectly sound. We are encamped on the N. side of a rocky island divided by a channel from Montreal Island. The whole inlet to the N'd and Eastward is choked with ice. Tomorrow morning the Island shall be thoroughly explored for vestiges of the missing party. Saw 2 or 3 seals some gulls, loon and many Esquimaux ducks. A track of a deer was seen on the island.

Th. 2nd. The men breakfasted early and left to explore the Island. At mid-day we heard shots and left immediately with Mr. Stewart. We met Bouché and Reid who showed us sundry articles belonging to a boat and a chip of wood with "Erebus" upon it. We then proceeded to the point where these were found and examined all the Esq. caches most of which contained blubber (*August*, 1855—*Montreal Island*—52—)

161. Trout here presumably means the Arctic Char, *Salvelinus alpinus*. (J.R.D.)

162. The Hudson's Bay Company Archives journal, as published in the Jour. Roy. Geogr. Soc., vol. 27, 1857, pp. 321-328, gives "heath of two kinds for fuel."

163. *Phoca hi pida* or *Erignathus barbatus*. (R.M.A.)

and seal oil, but one of them contained a kettle (tin) and another sundry iron works, such as chain hooks, blacksmith's cold chisel and shovel and a bar of iron and the hoop of butts apparently, a piece of cane, parts of the stands of instruments, a piece of wash rod of a gun, pieces of rope with the Government mark, etc., and a piece of wood with "Mr. Stanley" cut on it (surgeon of the Erebus). The search was continued till late in the evening, but no traces of the graves were discovered. A band of 10 deer were on the Island of which 5 were killed—2 by E. Kippling, 1, D. McLeod, 1, J. Johnson and 1, J. Fidler, all fat bucks. Our best hunter, Mushtegon, is lame. The day was beautiful and we had an opportunity of drying everything which was sadly needed. The whole inlet is full of ice, except to the E'd where there appears to be some water. Wind light and from the N.E. I promised a reward of £2 to he who found the first traces of the missing party—this was divided by W. Reid and J. Bouché.

Frid. 3rd. Wind Mod. N.E. and N.W. mod; cold, but a fine day. All hands searching for the graves but without success. A few trifling articles belonging to the ships found. Some of the adjoining islands were also examined. 2 deer were killed, fat bucks. (As were those yesterday) by Mustegon and J. Fidler. The (*August,* 1855—*Montreal Island*—53—) inlet is choked with ice except along the E. shore.

Sat. 4th. Wind Mod. varying between N.W. and N.E.; clear fine day. As the whole island is completely explored I made an attempt to get over to the Western Mainland, but could not succeed. We worked along shore through the ice, along the western end of the Island till we came to nearly the narrowest part of the crossing. The whole inlet appears to be still choked with ice; we can do no more till the ice is driven out. Some Canada geese were seen yesterday. Esquimaux ducks, loons and plovers are pretty numerous about the island; an Arctic hawk[164] was shot by one of the men.

Sund. 5th We worked through the ice to the western shore and all hands were employed in exploring the western shore to the Sd. and Nd., but no traces of the missing party were found. In the evening we worked our way through the ice opposite to the N. W'n extremity of Montreal Island. A Buck deer was shot just after we put on shore. Mr. Stewart and myself put the first balls in it and others afterwards finished the animal. Many deer were seen by the exploring parties, but none were killed, as I allowed no guns to be carried as we have plenty of meat. Very little fuel to be found. The shore is low with (*August,* 1855—*Montreal Island* — 54 —) sand-hills inland. Weather in general fine, but foggy in the morning. Wind light from N.E. New ice was forming before we put on shore.

Mond. 6th. A beautiful calm day. We have been working through the ice the whole day and have reached Pt. Pechell. Either Mr. Stewart or myself (while the others remain with the canoe) with 4 men have traced the coast from Montreal Island, but not a vestige of the missing party has been discovered. The country in this vicinity is dotted with small ponds of water with ridges of sand and gravel and occasional immense square blocks of grey and red granite; pieces of limestone are also scattered about. Many deer—perhaps 100—were seen. We can find no fuel at our encampment or within 5 miles of it; previously we found a scanty supply of the fuel used by Rae.[165] The canoes were much damaged today and I can shove them on no further—the remainder of my task must be completed on foot. Some Esquimaux ducks with their young, loon and laughing geese,[166] with plovers, snowbirds and W. grouse [167] were seen; in the Clear sandy bays some white-fish[168] were seen. Many very old Esq. Encts. were seen. The whole inlet seems to be choked with ice of great thickness and solidity. Notwithstanding the day was warm, new ice formed after 4 p.m.

Near Point Pechell

(*to be continued.*)

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164. The H. B. Co. Archives journal (see footnote 162) has "Arctic Hare" (*Lepus arcticus* (R.M.A.)) which is undoubtedly correct. Careful inspection of the journal indicates that this is the only place where mistakes in transcription would have resulted in gross error, and in this instance the H. B. Co. Archives journal was available for correction.

165. White heather, *Cassiope tetragona.* (A.E.P.)

166. This introduces a third species of goose. Its identity is best discussed later.

167. Snow Bunting, *Plectrophenax nivalis,* and Willow Ptarmigan, *Lagopus.* (P.A.T.)

168. *Coregonus* sp. (J.R.D.)

NOTES AND OBSERVATIONS

BLACK-CROWNED NIGHT HERON COLONY.—In 1937 there was a breeding colony of Black-crowned Night Herons (*Nycticorax nycticorax*) on Ile au Chat in the North River, Quebec, near the farm of Mr. Lawson Taylor. This place is between Lachute and St. Andrews East in Argenteuil County, about 6 miles south of Lachute and about 4 miles north of St. Andrews East. I understand that this colony has been there for some years.

The colony is in a dense stand of White Cedar averaging about 40 feet in height, and on June 16, 1937, when I visited this heronry, which is not readily accessible to the casual observer, I estimated the number of pairs of breeding birds at about 35.

The trees containing the nests were very slender and the branches up to about 10 feet from the top were small, leafless and very brittle. Banding of the young would be impossible without special equipment to climb the trees.

The only young that I saw was a half-grown one that climbed out of its nest, but from the noise and activity in and about other nests I believe that in a few days the young would have been at the stage where they leave the nests and clamber through the branches.

Lest publishing of this item should endanger these birds, attention is called to the fact that Black-crowned Night Herons are protected at all times by law.—T. S. HENNESSY.

OCCURRENCE OF THE AMERICAN EGRET AT ST. CHARLES DE BELLECHASSE, QUEBEC.—On October 28, 1939, I saw in the possession of Mr. Joseph Lessard, at St. Charles de Bellechasse, Quebec, a mounted specimen of the American Egret (*Casmerodius albus*), taken at that place by Mr. Lessard in August, 1939. The sex of this bird is not known.—HARRISON F. LEWIS.

MOURNING DOVE AT RELIANCE, N.W.T.—The Commissioner of the Royal Canadian Mounted Police has very kindly forwarded a report on the observation of a Mourning Dove at Reliance, at the east end of Great Slave Lake, a few miles from the barren lands. The bird was noted by L/Cpl. R. W. Thompson, in charge of the Reliance detachment of the Royal Canadian Mounted Police, from whose report the following details are extracted:

"My attention was first attracted to this bird by its long pointed tail and 'Pigeon-like' actions. I then noted the small black spot below the ear, the dark middle tail feathers, the fawn colouring, and the slight bluish cast about the head. This bird did not scratch for its feed, but kept picking about the yard. At no time did it give voice except when started, when it made a peculiar throaty whistling noise. I never at any time heard it make the mournful note described in the *Birds of Canada*. It also had red feet.

This bird arrived September 13th, and disappeared October 15th, and whether it migrated or was killed by a weasel I do not know. Natives here were certain that they had never seen a bird like it before. We had a very good opportunity to inspect this bird, as quite often it would be only a few feet from the window and when I was alone about the place I could walk up to within a yard or so of it."—C. H. D. CLARKE.

SOME ADDITION TO THE BIRD-LIST FROM LAKE ST. MARTIN, MANITOBA.—In 1937 the Royal Ontario Museum of Zoology published as Contribution No. 10, *The Birds of the Lake St. Martin Region, Manitoba*. This was based mainly on the work of Mr. Sam Waller during the period of 1930-6. As a result of further collecting by Mr. Waller in 1937, after the account was published, two additional species have been added to the list. These specimens, now in the Royal Ontario Museum of Zoology are:

Aix sponsa. WOOD DUCK.—An adult male, taken on the Lake St. Martin Indian Reserve on May 12, 1937.

Petrochelidon albifrons. CLIFF SWALLOW.—An adult female, collected on the Reserve on June 7, 1937.

In addition to the above, Mr. Waller secured the first specimen from Lake St. Martin of the Eastern Phoebe (*Sayornis phoebe*). This species had been recorded only from a record of a bird

heard but not seen on June 26, 1934 at Gypsumville, and from the identification of a deserted nest with eggs shown to us by Mr. Delgaty of Gypsumville in 1934.—T. M. SHORTT.

UNUSUAL BIRD RECORDS FOR KENT COUNTY, ONTARIO.—BAND-TAILED PIGEON, *Columba fasciata* Say.[1] A single individual was observed at Rondeau Provincial Park on the afternoon of September 6, 1930, and again on the morning of September 7. The bird was watched at the close range of from twenty to thirty feet for an hour or more. It was observed in flight, perching and also feeding on the ground. The bird was also seen by Mr. J. H. Smith, Miss Melba Bates and Mr. W. D. Bates. Mr. Bates was familiar with the species in California. The bird was in excellent plumage. It was checked almost feather by feather and point by point through 8x field glasses at a distance of about twenty feet with the plate of the species in Taverner's *Birds of Western Canada*.

—EASTERN MOCKINGBIRD, *Mimus polyglottos* L. One individual was seen in a garden at Rondeau Provincial Park during the first week of September, 1938. This bird was seen only once.

Another individual was observed in a garden at Chatham, on November 17, 1938, feeding on berries of Evonymus and barberry. It was seen almost every day up to mid-December. A second bird, probably the same individual, was seen in the same garden on February 15, 1939. , This individual was seen almost daily at feeding board until April 14. It became quite tame.—DR. C. C. BELL.

[1] Mr. Taverner's comments below on the Scarlet Ibis apply equally to the Band-tailed Pigeon—Ed.

THE SCARLET IBIS AND OTHER WADERS AT POINT PELEE NATIONAL PARK—On September 11, 1937, a trip was made to Point Pelee National Park to make arrangements for the forthcoming Federation of Ontario Naturalists field day which was to be held early in October. In examining the marsh area, the snowy egret, *Egretta thula* and the American egret, *Casmerodius albus* were seen in small numbers.

Returning to the marsh on September 13 to give his small daughters the opportunity of seeing the egrets, the writer was surprised to hear one of them exclaim "Daddy, there is a pink one!" The "pink one" was a scarlet ibis, *Guara rubra* (L). The bird was quite at home in the marsh, in company with the snowy and American egrets and great blue herons. It flew from time to time with apparent ease. Dr. W. E. Saunders was notified by telephone and arrived later in the day with his party to see the bird. The ibis remained in the marsh, at least until October 2. During this interval, it was seen by a large number of bird students from Chatham, London, Hamilton, Toronto and other points.

It was a matter of conjecture how the scarlet ibis arrived at Point Pelee marshes or from whence it came. It may have escaped from a zoo, although no such loss has been reported. Some persons are of the opinion that it may have been brought north by the severe tropical storm that visited the north-eastern coast of the United States earlier in the year.

In any event, the day of its discovery was a notable one as the author had the rare good fortune to have in the field of his glasses a snowy egret, and American egret and a great blue heron at the same instant, while a short distance away around the same small pond was a scarlet ibis and an eastern green heron, *Butorides virescens*, truly a great collection of waders for any location in North America.—GEO. M. STIRRETT.

THE SCARLET IBIS AND OTHER PUZZLING RECORDS.—The Fall of 1937 the ornithological editor received the report of an extraordinary occurrence,—no less than that of a Scarlet Ibis at Point Pelee on the Ontario shore at the west end of Lake Erie. As it is a spectacularly conspicuous bird and the account came with convincing corroborative detail from our well-known and oft-tried ornithologist, W. E. Saunders of London, there could be little doubt as to its accuracy. A report from the original discoverers puts the matter on permanent record in this issue of *The Canadian Field-Naturalist*.

Of course doubt may always remain as to whether it was a natural occurrence or the result of an escape from a zoo or aviary. Inquiry has failed to discover lost Scarlet Ibises from such institutions, which negative evidence however does not rule out that possibility. These questionable intrusives are constantly turning up and will probably occur in increasing numbers as more ornamental or aviary collections are established.

A Red-breasted Goose from James Bay is a case in point. This seemed like a normal feral bird and, had it not been for the leg-band it bore, might have been so regarded. A Gray-breasted Tree Duck from Lac St. Pierre, Quebec is another instance. It bore no label but can scarcely be anything but an escape. A notable instance is an Asiatic Egret in the Provincial Museum of British Columbia, about which considerable dispute arose, and whose status is still the subject of disagreement between local ornithologists.

With such things as Scissor-tailed Flycatchers demonstrated to occur on Hudson Bay, Caracaras at Sault Ste. Marie and Steller's Jay at Quebec, it is rashness to declare that the occurrence of any American (or perhaps European) bird anywhere on the continent is impossible though, short of transport by man, many of them are so improbable as to require irrefutable evidence for acceptance. The Scarlet Ibis is an inhabitant of tropical South America. There are individual records for the southern and Gulf coasts of the United States but none that are above suspicion or have not been seriously questioned. That such a bird should jump clear up to Lake Erie without having been noted as a straggler much nearer home would be most remarkable though theoretically not impossible. P.A.T.

AN ALBINO PORCUPINE (*Erithizon dorsatum*).—An event of interest to North American mammalogy was registered last winter in the southeastern part of the province of Quebec, when a white or albino porcupine was caught alive by Treffle Giroux, of St. Prosper Dorchester county. This freak animal was a young female about a year old, weighing ten pounds. The capture was made in the woods of St. Gédéon, (Beauce), where Giroux was working at a logging-camp, some 20 miles north of the Maine border. At the moment of discovery, the animal was hiding under a high pile of logs, where apparently he had found food and shelter in one place, gnawing at the bark of the some logs that were walls and roof to him. Giroux had to displace the logs before he had the chance to make a grab at the little beast and bring it to camp, where it was first housed in a wooden box. He finally took it to his father's farm in St. Prosper.

Though they are sometimes found, as well as albino deer, groundhogs, raccoons, squirrels, white porcupines are far from common. Probably no more than a dozen have been recorded in North America, in the last hundred years. Where-

as a large female is now exhibited in the New York Zoological Park, a stuffed specimen is preserved at the Museum of St. Johnsbury, Vermont. It is interesting to mention that the New York specimen gave birth to a black baby, in 1935. In the first decade of this century, the American naturalist George Shiras, 3rd, observed in the middle-west another white female, which was deaf and blind. He trailed her for five or six years, watching her activities in her particular small range, taking notes about her habits and the difficulties of life brought on by her double infirmity. He learned that she was a female of the species when, on a certain day in Spring she appeared accompanied by a black cub. The skin of a white porcupine was also seen by a friend of mine in Nominingue, north of Montreal, a few years ago. All this to recall that albino porcupines are rare, and that the capture made by Giroux is worth more than a mere mention.

This porcupine was captured on the 10th of February 1940. He is snow white from nose to extreme tip of tail. Like all albino specimens, he has pink eyes. This animal is very much alive and healthy. He is neither blind nor deaf, and reacts to any movement or sound in his vicinity. His owner told us that he ate willingly from the first, even in the presence of humans. He has a supply of pine and cedar boughs in his pen, but he also partakes of any vegetable or slice of bread handed in by members of the family. He may not relish captivity, but does not seem to suffer from it. He was the first albino to have been seen in the Beauce district.—HARRY BERNARD.

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Meetings are held each Monday evening, except on holidays from October to April, in the physics theatre of the University Winnipeg. Field excursions are held each Saturday afternoon during May, June and September, and on public holiday during July and August.

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VOL. LV OTTAWA, CANADA, FEBRUARY, 1941 No. 2

OBSERVATIONS ON SOME INTERESTING BIRDS IN KENT COUNTY, ONTARIO

By A. A. WOOD, GEO. M. STIRRETT and D. A. ARNOTT

BLACK-CROWNED NIGHT HERON, (*Nycticorax nycticorax*).—A colony was found nesting at the Bradley Marsh, Dover township, near the shore of Lake St. Clair, during the Spring of 1939. The colony of nests was situated in a pure stand of the narrow-leaved cattail, about fifty yards from an infrequently used, sandy road.

The nests examined were compactly built of dried (old) leaves and stems of the narrow-leaved cat-tail, *Typha angustifolia* L. They were lined with dried grass stems (apparently *Andropogon* sp.). The bottom of the nest, in most cases, just cleared the water which was a little over a foot deep. Twenty nests were seen and thirteen of them were examined for eggs and young. There doubtless was a larger number of nests in the colony as fifty-five herons were flushed from the location on May 17, two days before our examination. The nests were spaced from six to twenty feet apart within the colony.

Thirteen of the nests were examined on May 19. One nest contained three young and two eggs. The other twelve nests each had four individuals; one contained four eggs; six contained eggs and young and one contained four newly hatched young. The remaining four nests each contained four young, about nine inches long.

The first heron of the season was a female, found caught in a muskrat trap on March 28. The first bird flying over the marsh was seen on April 25. On May 16, thirty were seen; May 17, fifty-five and May 19, thirty-five.

Mr. Bradley, the owner of the marsh, had noted the herons in previous years and stated that during 1938 they had nested in the marsh a considerable distance from the nesting location of 1939.

HENSLOW'S SPARROW, (*Passerherbulus henslowi*).—Two typical habitats of this species were located along the drier marsh area in Dover township along Lake St. Clair. In one area, a bird was seen and heard singing on May 31, While at the Bradley marsh, the other location, a male bird was collected on May 17 while singing from a clump of sedge.

GOLDEN EAGLE, (*Aquila chrysaëtos*).—A golden eagle was captured by a hunter near Chatham in March, 1934. The bird was shot at, at close range and fell to the ground where it was picked up and found to be unharmed physically. It was brought to the city and caged. Here it was seen and photographed by Geo. M. Stirrett.

An eagle was also seen at close range at the Bradley marsh, Dover township, on December 21, 1939. It perched on a muskrat house for some time before continuing its flight up and down the lake shore.

GADWALL, (*Chaulelasmus streperus*).—This duck is rare in the county. Two pair were noted on the Bradley marsh, Dover township, on March 20, 1939. During the duck shooting season of the same year, about twelve were shot by hunters in the marsh.

YELLOW-BREASTED CHAT, (*Icteria virens*).—A female specimen collected on May 11, 1939, near Chatham. The only specimen seen during the year.

BALD EAGLE, (*Haliaeetus leucocephalus*).—A pair of eagles nested on the farm of Mrs. C. E. Peterkin, Mitchell's Bay, Dover township, during the Spring of 1939. They were visited a number of times during the year, and on April 5 two adults and one young in nest were seen. The nest, according to old residents, has been in its present location for at least twenty-five years.

HAWKS.—Hawks appeared to be more numerous during December, 1938 and January 1939 throughout Kent county than for a number of years. A total of fifty-five hawks was observed during these two months, consisting of the following species and number of individuals: Common Rough-legged, 18; Red-tailed, 17; Marsh, 13; Sharp-shinned, 3; Cooper's, 2; Red-shouldered, 1; Sparrow Hawk, 1.

[1] Kent Nature Club, Chatham, Ontario

KIRTLAND'S WARBLER (*Dendroica kirtlandi*)

By W. E. SAUNDERS

EVERY ornithologist in southern Ontario keeps on looking for this bird, which has been taken twice in the Province and again was seen by Dr. Paul Harrington at Petawawa in June, 1939.[1] In May of 1939, a small party of Londoners undertook to visit the bird in its Summer quarters in Northern Michigan. Leaving London early in the morning of the 20th we passed through Port Huron and Bay City, eventually arriving at the village of Mio, where lived Verne Dockham, a nature-minded employee of the Conservation Commission. That night we laid plans for the morrow, and as the early birds of the party wandered around the village in the morning they encountered some Clay-colored Sparrows. They were common in the vicinity, as we met them not only in the village, but all over the country when we stopped long enough to hear the wheezy little song which may be represented by the syllables *zee—zee—zee*. The Clay-colored Sparrow is a bird of the western prairies, where it is abundant; and perhaps this Michigan colony is the producer of the occasional specimens that have been seen near London, Toronto and other places in southern Ontario.

But, to return to the object of our search. It is well known to ornithologists that this warbler is a bird of very decided tastes, much more so than any other bird that comes to my mind at the moment. He makes absolute demands on Mother Nature as to territory and will accept nothing less. Those demands are few, but emphatic. His chosen abode is covered with Jack Pines (*Pinus Banksiana*) and he prefers them small, in fact, when they attain the height of fifteen feet, that is too much. And how unreasonable his demands seem ! His mate does not make her nest *in* the trees, but *under* them; and what possible difference can it make to a warbler whether the tree above its nest is ten or thirty feet high, provided that the nest is to be placed on the ground beneath; but such are their demands, and nothing else will do. So, Mr. Dockham piloted us to a piece of territory where the Jack Pines lived up to specifications, and there we found the warbler. We found him, of course, by his song, the way bird hunters nearly always get the rare and difficult things; and not only was this song almost startling in its volume, but the bird treated us as most favored guests. When first heard he was perhaps a quarter of a mile away, and at that distance his song was distinct to almost all of the party. Apparently he decided that we wished a closer acquaintance, so he came nearer and nearer, finishing by singing from a height of about ten feet in the Jack Pine nearest to our party of about ten people, and utterly unafraid. The song would probably be passed by, if heard in Ontario, so remarkably does it resemble that of the Northern Water-thrush, which, of course, is not thrush at all, but a warbler. Again and again, we noted that resemblance, but probably there is a saving clause—the Warbler sings by choice from Jack Pines, and there are no such native trees short of the Bruce Peninsula. But I am wondering about my own little plantation of Jacks, only a mile from the limits of London. It contains only about fifty trees of any size, but more are coming along and Mr. Kirtland *might* come down to investigate. At present, Middlesex is like almost all the other counties in Ontario in having no record whatever of this Warbler, but this state of affairs will not endure forever with so large a colony nearby and with the bird breeding at Petawawa. We hunted this warbler at no other place than near Mio, but were informed that it has occurred almost all the way across from Lake Huron to Lake Michigan, though it may not be found over all that area in any single year. The area occupied is large enough to contain many hundreds of the birds, and we were much pleased to find that the authorities are giving a very good protection to this very rare species, for it is not known to spend the summer in any other region than in this narrow belt across the Michigan peninsula.

It spends the winter, as is well known, in the Bahamas, and the hazards of that overseas journey may have a strong controlling effect on the total population of the species; or, has been suggested, the food supply on the Bahamas may not be sufficient to carry more individuals than the normal population of those counties in Michigan.

At the lighthouse on Long Point certain nights occur when many warblers are killed but never yet has there been a report of a Kirtland being one of the victims, apparently indicating that the birds have a narrow lane in which to migrate, from which there is very little deviation.

(1) The Jack-Pine Warbler, vol. 17, pp. 95-7 (1939).

NOTES ON RARE CANADIAN PLANTS II*

By HAROLD A. SENN

THE RANGE extensions set forth below are largely the result of routine identification during the past summer.

I am indebted to Mr. E. W. Hart for calling my attention to several of the specimens and to those in charge of the following institutions for the generous loan of material.

B.: Bailey Hortorium, Cornell University, Ithaca, N.Y.

BCM: Provincial Museum, Victoria, B.C.

C: Department of Botany, Cornell University, Ithaca, N.Y.

Can: National Herbarium of Canada, Ottawa.

DAO: Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa.

G: Gray Herbarium of Harvard University, Cambridge, Mass.

Iowa: Botany Department, Iowa State College, Ames, Iowa.

Man: Department of Botany, University of Manitoba, Winnipeg.

Minn: Department of Botany, University of Minnesota, Minneapolis, Minn.

NY: New York Botanical Garden, New York, N.Y.

T: Department of Botany, University of Toronto, Toronto, Ont.

US: United States National Herbarium, Washington, D.C.

Wisc: Department of Botany, University of Wisconsin, Madison, Wisc.

Gramineae

Polypogon monspeliensis (L.) Desf.

Although Hitchcock (Man. of the Grasses of the United States, 350, 1935) gives a general range for this species as west from New Brunswick to Alaska it does not appear to have been previously reported from Manitoba. The following specimen was sent to us by Mr. W. N. Denike of Winnipeg:

MANITOBA: Delta, *Denike* 794, marsh (DAO).

Chenopodiaceae

Polycnemum majus A. Braun in Flora, 24: 151. 1841.

While botanizing in the vicinity of Arnprior, Ontario, on the Renfrew-Lanark County line, on September 2, 1940, an unusual plant appearing somewhat like *Salsola* was collected. Later identification and comparison with material from the province of Charkov, U.S.S.R., Czechoslovakia, and Hungary proved this to be *Polycnemum majus* A. Br. The specimens cited below appear to constitute the first American record for the genus since inquiries instituted in 23 Canadian and United States herbaria have as yet disclosed no New World material. The natural range of the species covers much of central and southeastern Europe from Germany and Switzerland through the Balkan Peninsula to southwestern Russia.

A subsequent visit was paid to the colony on September 19th in the company of Mr Herbert Groh and an attempt made to determine its extent. The plant was found over a linear distance of approximately two miles but only in specialized habitats within the area. In waste land, particularly an old, almost entirely disused road allowance, the plant flourished in shallow soil underlain by limestone, being most abundant in depressions and in old wheel tracks. The most vigorous specimens however, made a solid mat for almost a quarter mile down the crushed limestone ridge in the centre of the moderately travelled road forming the county line between Lanark and Renfrew. The whole colony is well-established and must have been in existence for many years but the adjacent cultivated fields do not appear to have been invaded. The nearest railroad sidings each approximately 4 miles away, at Arnprior and Waba Siding, were searched for specimens in the hope of tracing the means of introduction of the species but the search proved fruitless.

The following specimens in the herbarium of the Division of Botany and Plant Pathology may be cited:

ONTARIO: Lanark Co., Pakenham Twp., Conc. X, Lots 26, 27, *Senn* 1631, 1677, 1686, *Groh* 1196, shallow soil over limestone; Renfrew Co., McNab Twp., Conc. X, Lot 1, *Senn* 1684.

Caryophyllaceae

Saponaria Vaccaria L.

The petals of this well-known species are ordinarily a rose-pink but an albino form with

*Contribution No. 640, Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada. Number I of this series was published as Contribution No. 556, in the Canadian Field-Naturalist, Vol. 52, pp. 132-133, 1938.

white petals was sent to me by Mr. L. T. Carmichael of Regina, Saskatchewan. An albino form has also been previously collected by Mr. H. Groh of this Division.

The following specimens may be cited:

MANITOBA: Morden, *Groh s. n.*, June 11, 1932, waste places (DAO).

SASKATCHEWAN: Regina, *Carmichael* 335, (DAO).

Ranunculaceae

Caltha natans Pallas

Through the kindness of Mr. W. N. Denike of Winnipeg I was supplied with specimens of this rare species collected at Ingolf, Ontario. Although Ingolf is very close to the Manitoba boundary these specimens constituted the first Ontario record for the species and interested me in tracing the North American distribution of the plant.

This species of *Caltha* is found on the muddy shores of pools, lakes and slow-moving streams. It has a floating or creeping habit and is frequently somewhat branched. It is especially characterized by a follicle length of 5 mm. or less, the follicles occurring in dense spheroidal heads, by short oval anthers, and by small flowers which are white or white with pinkish or purplish cast. The leaves are variable in size but are always much smaller than those of the familiar *C. palustris* L.

The distribution of this species is of considerable interest since the outer limits of its range enclose a very large area through much of which the plant has rarely been collected. Gaps of great distance occur between stations such as that between Edmonton and the southern Manitoba-Ontario boundary.

Hultén (Flora of Kamtchatka and the adjacent Islands, 2: 95, 1928) gives the Old World distribution as eastern European Russia through northern Asia, and Porsild (Rhodora, 41: 226, 1939) states that the species is "fairly common in tundra lakes and bogs of the Bering Sea Region." He cited Alaskan specimens from Pastolik, Norton Sound; Nome, Seward Peninsula; and Buckland River on the north coast. Scamman (Rhodora, 42: 324, 1940) in reporting collecting the species at Circle Hot Springs in the Interior of Alaska stated that it is probably rare in the Interior.

Britton and Brown (Illus. Fl. ed 2, 2: 86, 1913) give the easternmost and southernmost station for *Caltha natans* as Tower, Michigan. This is obviously an error for Tower, Minnesota, which is located in the vicinity of Vermilion Lake, the site of several early collections. The National Herbarium of Canada has a sheet labelled Idaho, St. Louis Co., *J. N. Scofield s.n.*, July, 1892, from the herbarium of J. H. Sandberg. The state was evidently written on the label in error since the specimen appears to be a duplicate of that examined from Iowa State College, and St. Louis Co., Minnesota, is the county in which Vermilion Lake is situated. Thus there is no clear-cut evidence for the occurrence of *Caltha natans* in either Michigan or Idaho, and Foxboro, Wisconsin is the southernmost and easternmost station for the species.

The known North American range of this species is indicated by the following specimens which I have examined:

ONTARIO: Kenora District, Ingolf, *Denike* 133, July 11, 1940, *Denike s.n.*, Aug. 5, 1940, running water (DAO) .

MANITOBA: Creek between High Lake and Falcon Bay, *Lowe s.n.*, August, 1920 (Man).

WISCONSIN: Douglas Co., Foxboro, *Goessl* 7743 (Wisc).

MINNESOTA: St. Louis Co., *Sandberg s.n.*, July, 1892 (Iowa); Vermilion Lake, *Sandberg* 487 (C, Iowa, Minn, US, Wisc.), *Sandberg s.n.* (G, Minn), *Sandberg* 6038 (Can, NY); Tower, *Hill s.n.*, Aug. 21, 1889, pools and slow flowing streams (G, NY, US), *Lyon s.n.*, July 18, 1904 (Minn), *Scofield s.n.*, 1891 (B).

ALBERTA: Methy River, Lat. 57° N., *Macoun* 177.56 (Can); Lesser Slave Lake Dist., near Slave Lake Town, *Brinkman* 4346, roadside ditch (C, NY); Lesser Slave Lake, *McVickar s.n.*, August, 1911, muddy shores (T); Lesser Slave Dist., Smith, *Brinkman* 3886, small pond and stream (C, NY); northern Alberta, Round Lake, *Spreadborough s.n.*, Oct. 10, 1898 (Can, G); northern Alberta, Lake Ste. Anne, *Spreadborough s.n.*, June 10, 1898 (Can); Peace River District, High River, *Groh* 1058, mud around water-hole (DAO); Peace River Crossing, *J. M. Macoun* 59, 518, slow flowing brooks (Can, G, NY, US); Athabaska Plains, *Macoun* 53 (G) 569 (T); 10 miles east of Edmonton, *Macoun & Herriot* 69, 779 (Can, G); creek near Edmonton, *Macoun* 117 *A*. 56 (Can).

BRITISH COLUMBIA: Peace River District: Tupper Creek, *Cowan* 10939, mud flat (BCM, G); Rose Prairie, *Groh s.n.*, Sept. 6, 1934, along slow stream (DAO).

ALASKA: Circle Hot Springs near Steese Highway about 138 miles north of Fairbanks, *Scamman* 181 (G).

Compositae

Aster alpinus L.

Judging from available specimens and records this predominantly Old World species was thought to be limited in western Canada to the Rocky Mountains, several collections having been made in the vicinity of Banff, Alberta. Henry (Flora of Southern British Columbia and Vancouver Island, 294, 1915) gave its range as "Rockies." During the past summer Dr. William Newton of the Saanichton Laboratory of this Division collected on Vancouver Island the specimen cited below:

BRITISH COLUMBIA: Vancouver Island, Forbidden Plateau, *W. Newton s.n.*, August 18, 1940 (DAO).

Senecio viscosus L.

Greenman (Ann. Mo. Bot. Gard. 2: 579, 1915) gave the distribution of this species as "eastern North America from Nova Scotia to Pennsylvania, near the coast." Evidently it has recently spread westward since Mr. W. N. Denike has collected it near the Canadian Pacific Railway in Winnipeg. The following specimen may be cited:

MANITOBA: Winnipeg, Canadian Pacific Railway, *Denike* 1417 (DAO).

ATLANTIC SALMON IN UNGAVA BAY

By J. R. DYMOND

ALTHOUGH Atlantic salmon have long been reported from Ungava Bay there have been those who have continued to doubt the accuracy of the reports. The latest of these doubts was expressed by Kendall (1935) with reference to a note by the writer (Dymond 1932) recording the evidence of Captain John Hearn of the occurrence of *Salmo salar* in a number of rivers flowing into Ungava Bay.

Following publication of Dr. Kendall's statement throwing doubt on the occurrence of Atlantic salmon in Ungava Bay, I wrote the Hudson Bay Company asking if it were possible to obtain specimens of the salmon of Ungava Bay. In reply I was informed by the Company that salmon had long been exported from the Ungava Bay area to London, England. They occurred, according to the Company's statement, in considerable numbers in the Koksoak (also called Chimo), in George's and Whale Rivers but only occasionally in the Leaf River. Through the courtesy of the Hudson's Bay Company I was also sent a number of specimens of salmon procured by Mr. W. A. Smith, Manager of the Fort Chimo Post. Unfortunately the specimens were received in poor condition but sufficient could be determined from their examination to make certain that they were *Salmo salar* and not *Salvelinus alpinus* as Dr. Kendall had suggested.

Kendall (1909) in his account of the fishes of Labrador included in his chronological bibliography and list of collections, a list of specimens in a collection "in the Smithsonian Institution, made in the vicinity of Fort Chimo, Ungava, identified by Dr. Tarleton H. Bean." The collection was made by L. M. Turner who "so far as can be ascertained spent two winters and one summer in this region—1882-1884." One of the species included in this collection was *Salmo salar*.

Low (1897) as a result of explorations along a number of rivers, including the Koksoak, of the Labrador peninsula, reported *Salmo salar* as "abundant in the rivers of the St. Lawrence and the Atlantic coasts and also in the rivers flowing into Ungava Bay . . . The salmon enter the rivers of the St. Lawrence coast early in June, are taken in Hamilton Inlet in July, but do not ascend the Koksoak and other rivers of Ungava Bay until about the middle of August." In the same report Low records the absence of Atlantic Salmon from Hudson Bay.

That an extensive salmon fishery was carried on by the Hudson's Bay Company as early as 1897 at George's, Whale and Ungava or Koksoak Rivers is stated by Wakeham (1898). His report of salmon as far north as Lancaster Sound, as well as that of Bean (1879) of *Salmo salar* in Cumberland Gulf waters are not supported by specimens. Acceptance of such reports must

await receipt of specimens from the waters in question. The records of the occurrence of *Salmo salar* in the rivers of Ungava Bay are however supported by specimens as indicated above.

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CHARLES HENRY YOUNG

1867 - 1940

On May 6, 1940, Charles Henry Young, a well-known naturalist, passed away very suddenly at his home, 136 Powell Ave., Ottawa, Ont. He was in his 73rd year. His passing was a great shock to his many friends and acquaintances as apparently he had been enjoying good health up to the time of his death.

Born at Isleworth, England, February 11, 1867, Mr. Young was educated in England and came to Canada in 1894. In Ottawa he married the former Gertrude May Tilley on September 16, 1896.

The writer met Mr. Young soon after he was appointed an assistant in the old Division of Entomology attached to the Experimental Farms Service. At that time, Mr. Young was operating a farm near Billings Bridge and on a number of occasions it was my privilege to spend the night with him, hunting insects and making other observations in the immediate district of the farm. Since that time, we have been close friends.

Mr. Young was also closely associated with the late Dr. James Fletcher, the first Dominion Entomologist. In the early days of my acquaintance with Mr. Young, he would frequently spend afternoons and evenings with us at the Central Experimental Farm. On these occasions, which were mostly during the winter months, we made snowshoe excursions in the district of the Farm and then returned to Dr. Fletcher's house for a camp supper and walk into the city afterwards.

In 1910, Mr. Young entered upon the work which brought him such prominence that a few years ago, Washington officials sought him to accept a position there, which was refused.

Mr. Young was employed in the Geological Survey of the Department of Mines and Resources for many years. On April 14, 1907, he was employed temporarily as Assistant to the Curator of the Museum. On September 1, 1908, the appointment was made permanent. He served for many years as Museum Assistant but later on was promoted to the position of Collector-Preparator Specialist. He had an intimate acquaintance with leading scientists and government officials, as well as a host of friends in Ottawa and throughout Canada. He was an outstanding taxidermist and his name will go down in the history of the Canadian National Museum for his work in collecting and preparing thousands of specimens of birds, fishes and mammals. Mr. Young's ability as a preparator, particularly in the mounting of minute insect specimens, as for instance tiny moths, was recognized not only in Canada but in the United States as well. His greatest hobby was that of collecting insects

and his collection of Microlepidoptera, purchased by the Government some years ago, is now in the National Collection of Insects maintained by the Division of Entomology, Science Service, Department of Agriculture. Dr. R. M. Anderson, Chief of the Division of Biology of the National Museum of Canada, has stated that

> "As a field worker, Mr. Young was indefatigable. In the summer he would make the rounds of his traps before breakfast, starting at 4.00 a.m. if there was sufficient light, and by 5.00 a.m. at the latest, preparing his specimens later in the day, and be ready for another patrol in the evening. Any suggestion of a rare species or other desideratum would put him on the trail with the relentlessness of a Sherlock Holmes or a R.C.M.P. officer 'getting his man' and generally his efforts would be crowned with success."

Mr. Young served as a Director of the Entomological Society of Ontario for a number of years, and during this time contributed records of insect outbreaks for publication in the annual reports of the Society. The following are among the species of insects which have been named in honour of Mr. Young:—

Oncocnemis youngi McD.
Anomogyna dilucida form *youngi* Sm.
Laspeyresia youngana Kft.
Aphania youngana McD.
Peronea youngana McD.
Enchyrsa dissectella youngella Kft.
Crambus youngellus Kft.
Thiodia youngi McD.
Hilarographa youngiella Busck.

He was an ardent sportsman and took a keen interest in cricket and hunting, and during his early life in England was a devotee of steeplechasing.

Mr. Young's passing will mean a great loss to natural history in Canada. He was of tireless energy and even since his retirement in 1937, spent most of his spare time in the woods and fields searching for rare specimens of insects, which, it may be mentioned, he was unusually successful in finding.

His engaging personality and kindly disposition won for him many friends who mourn his death very sincerely.—ARTHUR GIBSON.

CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(*Continued from page 11*)

August, 1855—NEAR POINT PECHELL—55

Tuesd. 7th. Took an early breakfast and started with Mr. Stewart and all the men, except 2 of the Iroquois, who were left to arrange the canoes and look after the baggage. We were in light marching order. 5 men followed all the sinuosities of the coast while the rest of the party swept the country further inland. For about ⅓ of the distance the country was intersected by small lakes; the remainder was composed of sand hills devoid of all vegetation, and between them low vallies which are overflown in high tides. In one place the water appears to cross the Peninsula and often it nearly cuts through it. If the missing party died in one of these low spots, their bones must have been either swept away or buried in the sand. Many very very ancient Esq. Encts. but no new ones were seen; some perhaps 4 or 5 years old were seen at the Point Ogle; among them were found a small piece of cod line and a small piece of striped cotton which were the only vestiges found. We encamped late, at the point opposite Maconochie's Island. A very fat Buck deer was killed[169] and a few others were seen. A little beyond Pt. Pechell we crossed a river; it must be a large stream at high water; it ran from the Sd., I called it Lunosarier[170] after a relation of Mr. Stewart's.

169. The H. B. Co. Archives journal (see footnote 162) states that the men ate most of it raw.

170. The H. B. Co. Archives journal shows that this should be Le Mesurier.

(Ground white with snow this morning).
(Killed [171] by Paulet P. of[172] Fidler J.)

August, 1855—POINT OGLE—56

Maconochies Island and Point Ogle

Wed. 8th. Early this morning 4 of the best men were ferried across in the Halkett boat,[173] and the whole of Maconochie's Island was minutely examined without success. The wind drove in the ice so fast into the strait separating the island from Richardson's Point, that we were unable to cross over to examine it as I wished. The party killed another fat deer on the Island and returned at 2 p.m. It then began to pour down rain with a sharp N.E. gale, and we were all thoroughly soaked when we reached the encampment about 9 p.m. The tail of the party only arrived at 11 p.m. No fuel was to be had and of course no fires could be lighted so that we passed an uncomfortable night. A little fuel was seen on Maconochie's Island.[174]

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171. Refers to the "fat Buck deer."

172. probably should be "&".

173. According to the Report from the Select Committee on Arctic Expedition, 1855, p. 856, a "Halkett india-rubber boat" was left by Dr. Rae at York Factory, and it was ordered forwarded for the use of the Anderson party, along with some articles especially suited for Eskimo trade. Rae, in his "Narrative of an Expedition to the Shores of the Arctic Sea." London, 1850, says: "we also had one of Halkett's air boats, large enough to carry three persons." He found it very useful. In connection with Rae's last expedition it is stated (Select Committee Report, 1855, p. 837) that a Halkett boat named James Fitzjames, was presented to Rae by John Barrow. This would probably be the boat left by Rae at York Factory and used by Anderson. It seems to have been an early and, according to Rae, highly satisfactory form of inflatable rubber raft.

174. This brings us to a very interesting sequel to the Anderson-Stewart expedition, recorded by Dr. J. B. Tyrrell in "A Story of a Franklin Search Expedition," Trans. Can. Institute, vol. 8, pp. 393-402, 1908-09, read Dec. 5, 1908.

In the autumn of 1890 Dr. Tyrrell was travelling up the east shore of Lake Winnipeg when Joseph Boucher, "a little old French-Canadian," came to his camp. Boucher told him that the men who had been sent on by Anderson had seen a ship, but were so fearful of prolonging the expedition that they decided not to report it. Dr. Tyrrell took steps to obtain statements from the men themselves. He got a signed statement from Edward Kipling, and through two friends he got the story as recalled by Thomas Mustagan (as spelled by Tyrrell) and Paulet Papanakies.

Kipling stated that when they reached the island he and Henry Fidler went to the west and Mustagan and Papanakies went to the east. They returned to the starting point and thence to camp, where Papanakies told of having seen a ship. The information was not communicated to Anderson and Stewart because the men were tired of the expedition and wanted to get home. Next day on Montreal Island he and Fidler found the remains of a small boat, broken up by the Eskimos. This also was not reported.

Mustagan's story only mentions three men, himself, Papanakies and Kipling. He says that the other two went to an outlying island in the inflated boat and reported seeing nothing. Many weeks later, after disbanding, Papanakies told him and others that he had seen a ship and asked Kipling to say nothing about it. This story is at variance both with Kipling and the Anderson journal, but it must be remembered that Mustagan was an old man in 1893 when the story was obtained.

Since the whole history centres on Paulet Papanakies it is his story that must decide what is to be made of it. Paulet told of meeting Eskimos, but this could hardly have been on Maconochie Island, since they were fishing at the mouth of a river. Presumably it is the encounter recorded by Anderson at the mouth of Back River. Paulet learned from them that a ship had been "ruined" and people had died. He was with Mustagan on the island, but had separated from him to go to the summit of a smaller island, whence he saw, not a ship, but the masts of a ship. It was some time later that he told his comrades. He was "tired of the whole thing, and was thinking long to be home, and was afraid if I said anything about it, we should have to go back and see what it was."

There can be no doubt that Paulet saw something far out to sea, and that he thought it was the masts of a ship. From Kipling it would seem that he confided in his comrades when they were all in camp that night, and that discoveries of minor importance were withheld from Anderson by Fidler and Kipling next day. It would also seem that what Paulet saw was far away and none too clear, and his story indicates that he had the fixed idea that there should be a ship. King William Island should be barely visible from Maconochie Island; we have no indication as to whether Paulet knew that there was land in the direction he was looking. There are also deceptive mirages in the arctic. Nevertheless, as Dr. Tyrrell remarks, the eye of the Indian is keen and his power of observation unexcelled. Perhaps some future explorer will go to Paulet's island and look out to sea, to see if there is anything that could be mistaken for a ship.

Franklin's two ships drifted in the ice to a point off the northwest coast of King William Island, where they were abandoned. One of them drifted to the west of Adelaide Peninsula, where it was seen by the Eskimos, and then sunk. In order for there to have been a ship at the east end of Simpson Strait for Paulet to see, we must assume that the other ship remained beset in the ice until 1855 at some point unfrequented by Eskimos, and that in the summer of that year it drifted into Simpson Strait, disappearing entirely before winter. If a second boat had been seen by Eskimos they would have told Rasmussen and other explorers about it. Of course it might have been the boat known to the Eskimos, but if this is the case we have to assume that it remained afloat longer than is usually allowed (see Gibson, "Sir John Franklin's Last Voyage." The Beaver, Outfit 268, 1937, pp. 44-75.) We would also have to assume that it could drift into Simpson Strait and then out again. Paulet certainly thought he saw a boat, but it remains doubtful that he did.

August, 1855—ADELAIDE PENINSULA—57

Thur. 9th. The rain ceased about 7 a.m. and the canoes were gummed. We started at 9 a.m. It turned out a beautiful day, so that we were enabled to dry our clothes partially. The ice was even worse than when we were coming. One portage was made and by dint of shoving the ice aside and cutting it we reached to within 4 miles of our encampment of the 6th at sunset. New ice began to form at 4 p.m. and was thick enough to cut the canoes a little before we encamped.[175]

Frid. 10th. Left our Enct. at 3½ a.m. The ice was very close and cemented together with new ice, so that we made slow progress and injured the canoes. We therefore breakfasted early and afterwards got on a little better. When we arrived at the Strait separating Montreal Island from the W. Main the Halkett boat was launched and a small island examined on which were some old Esq. encampments. We afterwards proceeded along the south shore of Montreal Island which we found nearly clear of ice and after examining the Traverse from a high mountain determined on risking it, though the Eastern band appeared to be lined with ice. We crossed with a fine breeze aided by the paddle and got through the ice easily, there being large openings (Ice came in again, most fortunate we got across yesterday) (Mountains white this evening with snow) (August, 1855—POINT BACKHOUSE—58) between the floes. The breeze increased to half a gale and we continued on till 11½ p.m. when we encamped at Point Backhouse, shortly after which it began to rain at intervals and blow still harder. 2 seals were seen. At this point heather is pretty plentiful,[176] but there are no traces of deer.

Adelaide Peninsula

Sat. 11th. Unable to move. Blowing very hard between Wt. and N. all day with squalls of rain.

Sund. 12th. Unable to leave the Enc't before mid-day; it then lulled a little and we embarked. It was still blowing very fresh from the N.W. with a heavy sea, but we kept on and encamped at sunset above our encampment of the 30th. Showers of rain all day which turned to snow in the evening—very cold—I never experienced such piercing winds as blow on this coast; all of us are in winter rig, but stilled chilled to the bone. No deer seen today. 3 starving wolves came close to the canoes and stole a piece of Pem'n;[177] fortunately for them the guns were wet. (The Esquimaux were just leaving. Their fish caches were made. They were leaving for some pass to watch for deer). (Doz. Iron and copper boilers and tin soup tureens).[178]

August, 1855—POINT BACKHOUSE—59

Mond. 13th. Left at 3 a.m. Just after embarking it began to snow and then rain heavily and this was the case with a slight interval all day. Saw the Esquimaux at the Rapids leading to L. Franklin. They now number 3 families; consist of 5 men, 3 women and about 12 lads and children. Endeavoured by all means in our power to find out if they had papers of any description, but they had none. They showed us sundry articles got from the boat, such as tin boilers about 18 inches long by 12 inches broad, an oval frying pan, a Ferriers chisel, a fragment of a hand saw, a piece of the metal plate of a thermometer and of an ivory rule. Most of their paddles were made out of ash oars, pieces of mahogany, elm and pine. They made us understand that they had not seen the ships which had been wrecked but had heard of it from others, and again showed us by signs that the crews of the vessels had died from starvation. We got Esq. boots, etc., for the men and made them presents of a grafting saw each, fish spears, seal spears, knives and glass and sundry trifles to the ladies. We got a little aft wind in L. Franklin. I encamped at the head of the Rapid before arriving at McKays Peak, but Mr. Stewart below it having broken his canoe very badly. No animals whatever seen.

August, 1855—THLEWYCHO—Up—60

Tues. 14th. Mr. Stewart arrived at 4 a.m. and we then left. The water has fallen so much we ascended McKay's Peak Rapid with the paddle; an aft N.E. wind helped us on famously and encamped late, considerably above Back's encampment of 26th July. It was raining the whole day; just before encamping a fine rainbow made its appearance. A solitary starving wolf was seen today.

175. The H. B. Co. Archives journal (see footnote 162) here states: "No deer were seen—*all the tracks go southwards.*" In the present journal Anderson makes this observation on August 15th.

176. *Cassiope tetragona* or *Empetrum nigrum.* (A.E.P.)

177. The H. B. Co. Archives journal has this observation on August 11.

178. The passages in parentheses undoubtedly belong with the entry for August 13. It was customary for the Eskimos all along this coast to catch and dry large quantities of the char that in June and July migrate up the streams and rivers. Then in August they hunted the caribou, which by that month had shed their winter coats and were fat from summer grazing. (D.J.)

Wed. 15th. We were all so wet and stiff that no one awoke till late. We left at 4¾ a.m. The rainbow of last night did not deceive us; the day was beautifully clear and warm, and we carried sail with a fine N.E. breeze for half the day, and made fine progress having encamped at the Rapids below Wolf's Rapid. This fine day enables us to dry our clothes and bedding which were actually getting mouldy. Some of the men began to complain of rheumatism and it is not surprising. I did not take up the Pemmican cached on the 27th ult. as it was rather out of the road, we have also enough and the canoes are rather too heavy. Geese are now flying. Not an animal has been seen today, but the tracks of deer were seen both yesterday evening and today, all going to the South'd. This accounts for our seeing no deer on Adelaide Peninsula on our way back.[179]

August, 1855—THLEWYCHO—Up—61

Thur. 16th. This has been a day among the Rapids. The canoes received much damage in Escape Rapid; Mr. Stewart's canoe was broken and mine completely ungummed. Encamped at 6¼ p.m. about 6 miles above Escape Rapid. Mr. Stewart's canoe only arrived at 7½ p.m. We lost also about ¾ of an hour at breakfast in gumming her. A decharge was made at one strong place in Escape Rapid. Took up our cache in good order. Wind fresh ahead from the N.W.; showery. Yesterday we saw a few sand flies, but today they were in clouds. Neither Musk Oxen nor deer were seen. The geese now fly, so that we get no fresh provisions. 3 wolverines, a few ermines and several young foxes[180] seen. Last night the Aurora was seen for the first time faint in the south, as well as the Great Bear, etc. Venus we saw some days since.

Friday, 17th. Left at the usual hour. Rained at intervals last night and throughout the day. Mr. Stewart's canoe again broken badly in still water; it was repaired at breakfast time. The River below Sinclair's Falls very shallow; a portage was of course made there and the canoes gummed hastily. The remainder of the Rapids were passed to Lake McDougall safely. We encamped late at the head of the Rapid. A doe R. Deer[181] was seen today. I shot 3 W. grouse [182] (young ones); they are now ⅔ grown.

August, 1855—THLEWYCHO—Up—62

Sat. 18th. It was blowing such a gale from N.E. this morning that it was impossible to leave before 10 a.m. It had then moderated a little, and, though still blowing fresh with a heavy sea, we managed to reach the first rapid in the river (say 10 miles from Rock Rapid) falling into McDougall's Lake. We then hoisted sail and had a fine run for a couple of hours. We got up several small rapids and encamped at 7½ p.m., considerably above our encampment of the 24th ultimo. The river is now rather shoal, having fallen 10 or 12 feet. Not an animal of any kind was seen. Weather showery.

Sund. 19th. Mounted all the Rapids to L. Garry without accident and encamped at the Narrows at our encampment of the 22nd ultimo. The first part of the day was clear and calm which enabled us to dry our clothes, only to be again wetted in the evening by heavy rain. Wind variable. We carried sail about 2 hours as far as the 2nd sand hill from nearly the first one. At the last large Rapid coming up a decharge was made, it being shallow. Saw swamp berries [183] for the first time coming up; they were ⅔ formed. The men chose to compliment me by calling the fine sand hill in the middle of the channel connecting L. Garry to L. McDougall, Anderson's Hill. 10 deer were seen this evening. Took up our cache below the Rapid at the end of this Lake in fine order.

August, 1855—LAKE GARRY—UP—63

Mond. 20th. Heavy rain and strong gale last night from various points; it was still raining when we embarked at 3¾ a.m., it cleared up partially afterwards. At this Rapid between L. Garry and Pelly we saw some Esquimaux, then only women and children when we passed on our way up and they then ran away, but now the men were there and they came to us immediately. They had various articles used by us in the trade which they must get from the Churchill Esq. There were 3 women, 6 children, and 6 men (2 old, 1 middleaged and 3 young men); 2 of them [184] we had previously seen at McKinley's River. I think there must be a river falling into the deep bay on the E'd of L. Pelly. We gave them knives, spears, dogs,[185] scissors, etc. and parted famous friends. They gave us some deer's meat. Encamped at sunset, near the head of L. Pelly.

179. See footnote 175.

180. Wolverine, *Gulo luscus;* Weasel, probably *Mustela arctica* Fox, probably *Alopex lagopus.* (R.M.A.)

181. *Rangifer arcticus;* (R.M.A.)

182. Willow Ptarmigan, *Lagopus lagopus* (P.A.T.)

183. Probably "baked-apple," *Rubus Chamaemorus,* or possibly *R acaulis.* (A.E.P.)

184. The H. B. Co. Archives journal (see footnote 162) states that these two were young men.

185. See footnote 149.

The wind was strong ahead all day. About 25 deer were seen today, all going to the Sou'd, the same is the case with the Canada geese.

August, 1855—LAKE PELLY—UP—64

Tuesd. 31st. It was miserable weather when we embarked at 3 a.m.; it was blowing fresh and raining. At Bullens R'r we hoisted sail and carried it for about half the day. We were much incommoded by sand banks above Bullen's River; the same was the case in a minor degree when going down. The water in L. Garry and above it does not appear to have fallen so much as below it. Below and at McKinley's River we saw the same Esquimaux as when descending. There were 8 tents; about 10 men were present and 8 women and several children. The women are all of very low stature, good looking; the young women are only tatooed after they have children. Saw several stone kettles made with 5 slabs sandstone cemented together.[186] These Esq. seem a remarkably harmless, honest and clean race—clothing, canoes and tents made of deerskins; have many of our articles of trade. They made us understand that they came down McKinley's River, but that it was nearly dry at present. The wind headed us towards the evening and the rain never ceased. We encamped a piece above McKinley's River. Everything we have is now soaked with rain. We have found plenty of willows since reaching Lake Garry.

August, 1855—THLEWYCHO—UP—65

Wed. 22nd. Left early. These Esquimaux came to see us start and accompanied us a short distance. Alders[187] are seen at the Hawk Rapids for the first time. The long line of Rapids below and above Hawk Rapids were safely ascended; it then began to rain very hard and continued without cessation till at last I could not endure seeing the men suffering so much and encamped at 5½ p.m.; 5 hours above Hawk Rapids among the sand banks. Mr. Stewart's canoe cannot keep up with mine and retards us considerably; the fact is both canoes are now dreadfully leaky and his the worst. Some ripe berries ? Crow berries were picked—the leaf is red. Several wolves, gulls and crows[188] were below Hawks Rapids feasting on the drowned deer, but not a deer was seen either today or yesterday; several bands of Canada geese and grey wavies going to the sou'd. At the Rapids between L. Garry and Pelly and below Hawk Rapids appear to be the only good deer passes we have seen since leaving the coast, tho' there are doubtless others.

Thurs. 23rd. Heavy rain all night. Left at 2½ a.m. amidst drizzling. It cleared up at breakfast and enabled us to partially dry our clothing etc., but heavy showers soon wetted us again; the sun, however, shone out at intervals. (*August*, sun,however, shone out at intervals. (*August*, 1855—THLEWYCHO—up—66). I encamped at 6½ p.m. (to avoid a heavy storm which threatened us) a little below Baillie's R'r. The wind assisted us a little today and the men paddled well, but our progress was much impeded by sand bars which rendered the channel of the river most tortuous. Esquimaux marks as high up as this.[189]

Friday 24th. Ascended the cascades &c above Baillie's River; made 2 decharges. Encamped late at the sand cliffs a little below our encampment of the 17th ulto. For a wonder it did not rain till midday, and was positively warm when walking; it then began to rain and we had occasional showers till evening. 4 deer and a wavy seen; numerous flights of laughing geese[190] going to the Sou'd. The wind helped us on after midday.

August, 1855—L. BEECHY—UP—67

Sat. 25th. Left at 2½ a.m., wind blowing fresh from the W'd with frequent showers of rain and hail. Mr. Stewart's canoe again broken before breakfast—which retarded us a little. We encamped at 9 p.m. at Beechy's Lake at the head of the cascades. This was of course, a complete portage. The canoes are now distressingly heavy, particularly mine. No deer seen, but about 20 Musk Oxen were grazing on the left of the river below the cascades; laughing geese going to the S'd. It appears that much rain has fallen about here. L. Beechy has only fallen about 6 inches. Took up our cache in good order, except a bag containing some meat which the wolves had got at and devoured; 2 of these beasts were seen in the portage. The men gave two of the sand cliffs to Lochart and Stewart.

Sund. 26th. The canoes required so much gumming, etc. that it was 4¾ a.m. before we

186. Most kettles were made of a talc chlorite schist, but a few kettles made from a rock resembling sandstone have been brought back from the west coast of Hudson Bay. (D.J.)

187. *Alnus crispa*. (A.E.P.)

188. Again undoubtly ravens. (P.A.T.)

189. The junction of Baillie River with Back River roughly marked the limit of Eskimo penetration to the west. A trade route from Bathhurst Inlet to the Thelon River crossed Back River in this vicinity. (D.J.)

190. We now have enumerated Canada Geese, "laughing geese," "grey wavies" (White-fronted Geese), and "wavy," which may mean the same as grey wavy. Wavies are mentioned again on the 27th, after several mentions of laughing geese. (P.A.T.)

left. Strong head winds accompanied by rain and sleet prevailed all day and retarded our progress; much water was shipped and our crazy canoes bent in with every wave. 20 or 30 Musk Oxen were seen but no deer. Encamped at dusk about 5 miles above the Willow Islands at the head of L. Beechy. Froze hard at night.

August, 1855—BEECHY'S LAKE—UP—68

Mond. 27th. Left at 2½ a.m. amidst rain. It cleared up in the middle of the day and we rejoiced to see the sun; towards evening the rain recommenced. The wind, however, was favorable and helped us on considerably. Encamped when it was nearly pitch dark at the foot of the Long Rapids below where we left our canoe on the 15th ultimo. Mr. Stewart's canoe was again badly broken and he was obliged to encamp below as with this exception the long line of rapids in this day's march was ascended without accident. 2 young laughing geese were killed. Some of our best shots fired at a Musk Bull from the canoe, and one ball hit him apparently on the end of the spine and paralyzed his hind quarters; he, however, soon recovered and escaped. A few Musk Oxen were seen and at dusk 2 or 3 deer; many flocks of wavies pointing to the Sou'd. Froze hard tonight.

Tuesd. 28th. Detained till 5.40 waiting for Mr. Stewart; this delay is most vexatious. Everything was hard frozen this morning; the tent was as stiff as a board. Found our first cache in good order and took all the Gd. Benches and Mast (*August,* 1855—THLEWYCHO—up—69) yards of the canoe left there for poles. The canoe was also broken up for firewood. Met with no breakages today. Encamped at dusk above the Rapid where Cap. Back repaired his boat and sent back his carpenters. A little snow fell before breakfast, but afterwards the day turned out beautifully fine—but very cold though the wind was fresh from the Sou'd which retarded us much. 7 deer were seen but no Musk Oxen. Some flights of grey wavies seen. The river is lower than on our way down, but not so low as I had anticipated.

Wed. 29th. Left at the usual hour. Just below Musk Ox Rapid a small band of deer was seen, one of which, a fat buck, was shot by Mustegon. Musk Ox Rapid was very shoal; its ascent by the canoes light and the carriage of the pieces occupied upwards of 6 hours. The canoes were completely ungummed and it took 2 hours to repair them. Encamped at dusk at the head of Musk Ox Lake; it took 1 35/60 hours to make the traverse, hard paddling. The day was the first without rain (& beautifully clear) that we have had since leaving Pt. Ogle. As the men have behaved so well, and as we (A cache left by Indians 3 MBr meat[192]) (*August,* 1855—THLEWYCHO—up—70) have hard work still before them, I have promised them each £5 in addition to their wages, and moreover that should their conduct be good and if they exert themselves on their way to R.R. and Nor. Ho.,[191] that should they arrive before the expiration of their year's term, that they shall receive their whole wages as for the entire year, thus changing their terms from the year to the trip. J. Fidler and Paulett are to get £5 extra for acting as steersmen.

Thursd. 30th. Another fine day. The men worked splendidly. The river from the lake above Musk Ox Lake is nearly dry and it was therefore a continuous portage interrupted only by a small pond and lake. We reached the little lake close to Sussex Lake and see L. Aylmer close to us. There is still a little ice on the borders of this lake, the one we are at. Saw 3 deer. One of the men laid up with a sore foot. Shot 3 Rock Partridges.[193] Numerous flocks of snow geese,[194] partridges etc. Aurora Borealis point to the Sou'd.

(to be continued)

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191. Red River and Norway House.

192. "Three skins worth of meat"

193. Rock Ptarmigan, *Lagopus rupestris* (P.A.T.)

194. This is actually the fifth (and last) name by which Anderson reports geese seen by him. Using his own names, he found two species, the Canada Goose and the grey wavy, breeding abundantly on Back River. They are indentifiable as *Branta canadensis,* in the heart of the breeding range of *leucopareia* and *Anser albifrons.* Wavies mentioned casually may have been Anser albifrons in some cases. In addition he mentions "laughing geese" which were encountered near Point Pechell, Adelaide Peninsula, and in migration at various places during the return journey, and "snow geese," mentioned here and again on September 5th. The Snow Geese are undoubtedly *Chen hyperborea.* The term "laughing goose" is usually considered to refer to the grinning patch, possessed by Chen hyperborea and by the Blue Goose, Chen caerulescens. In this case the Snow has already been mentioned, the Blue Goose has recently been found breeding at Perry River, as has also Ross's Goose. Chen rossi. "Laughing Goose" was also used for the White-fronted Goose by some early writers, e.g. Hearne. (P.A.T.)

CHRISTMAS BIRD CENSUSES, 1940

WOLFVILLE, N.S.—December 28, 1940; 12.00 noon to 5.00 p.m. Partly overcast; no wind; ground bare; temp. 36° at start. Two observers, together most of the time. 65 miles by auto, 3 on foot. Black Duck, 6; American Common Merganser, 4; Eastern Red-tailed Hawk, 1; Nova Scotia Ruffed Grouse, 2; European Gray Partridge, 12; Herring Gull, 8; Northern Downy Woodpecker, 2; Northern Blue Jay, 4; Eastern Crow, 88; Black-capped Chickadee, 18; Acadian chickadee, 1; Red-breasted Nuthatch, 2; Brown Creeper, 2; Eastern Golden-crowned Kinglet, 5; Common Starling, 14; English Sparrow, 55; Canadian Pine Grosbeak, 37; Eastern Savannah Sparrow, 1; Slate-coloured Junco, 5. Total, 19 species, 267 individuals. The noteworthy observation in this list is that of a Savannah Sparrow, which is most unusual here at this time of year.—R. W. TUFTS AND JOHN ERSKINE.

MONTREAL, QUE.—(Mount Royal, Westmount, Cote St. Luc, Back River, St. Lawrence River and South Shore from Caughnawaga to Longueuil)—December 22, 1940; 8.00 a.m. to 4.30 p.m. Sky overcast, snowing heavily till 10.00 a.m., then clearing; 8 in. snow on ground; temp. 24° at start, 26° at finish. 15 observers in 7 groups as follows: Party I, 2 observers, 3 hours, 30 miles by car; Party II, 4 observers, 6 hours, 9 miles by boat and on foot; Party III, 3 observers, 4 hours, 8 miles on foot; Party IV, 1 observer, 3 hours, 7 miles on skis; Party V, 2 observers, 4 hours, 6 miles on foot; Party VI, 2 observers, 6 hours, 10 miles on skis; Party VII, 1 observer, 3 hours, 10 miles by car and on foot. Total miles afoot, 16; on skis, 17; by boat, 8; by car, 39; total hours afield, 29. American Common Golden-eye, 471; American Common Merganser, 15; American Goshawk, 1; American Sparrow Hawk, 1; Iceland Gull, 1; Herring Gull, 12; Great Horned Owl, 1; Yellow-shafted Flicker, 3; Hairy Woodpecker, 1; Downy Woodpecker, 14; American Crow, 2; Black-capped Chickadee, 7; White-breasted Nuthatch, 12; Brown Creeper, 3; Cedar Waxwing, 5; Northern Shrike, 1; Common Starling, c. 1120; English Sparrow, c. 1106; Red-winged Blackbird, 1; Pine Grosbeak, 33; Redpolled Linnet, 49; Slate-coloured Junco, 2. Total, 22 species, 2,861 individuals. Iceland Gull identified at 50 feet by Wynne-Edwards; possibly a Glaucous Gull. Snowy Owl, Ring-necked Pheasant seen previous day.—R. S. AND P. C. ABBOTT, W. BROWN, J. D. CLEGHORN, J. A. DECARIE, J. D. FRY, B. GOLLOP, C. E. HALL, S. MCFARLANE, E. MUNROE, D. RYAN, D. M. SCOTT, L. M. AND E. E. TERRILL, V. C. WYNNE—EDWARDS (*Province of Quebec Society for the Protection of Birds*).

HUDSON, QUE.— (Including Hudson Heights and Whitlock Bird Sanctuary)— December 22, 1940, 9.00 a.m. to 4.30 p.m. Sky overcast; 12 in. snow; no wind; snow flurry in morning; temp. about 22°. 10 observers in 6 parties, some on skis, some on foot, some in cars. Ruffed Grouse, 7; Hairy Woodpecker, 6; Downy Woodpecker, 25; Blue Jay, 61; Black-capped Chickadee, 178; White-breasted Nuthatch, 26; Red-breasted Nuthatch, 2; Cedar Waxwing, 9; Common Starling, 66; English Sparrow, 15; Redpolled Linnet, 105 (largest flock, about 30); American Goldfinch, 5; Tree Sparrow, 1; Snow Bunting, 16 (one solitary bird, apparently injured). Total, 14 species, 522 individuals.—ALLEN BLENKINSHIP, P. B. BUCKLEY, AMY CLARKE, MR. AND MRS. E. D. CROLL, BRUCE LANCEY, A. HOWARD MULLAN, DUNBAR MULLAN, GEOFFREY G. OMMANNEY, R. L. PUXLEY.

OTTAWA, ONT.—December 22, 1940; 7.30 a.m. to 4.10 p.m. Cloudiness 100%, 10 in. crusted snow, calm, temp. 33° at 9.00 a.m., practically no change all day. Observers in parties as follows: Party I, 1 observer, 8¾ hours, 8 miles; Party II, 1 observer, 1¾ hours, 3½ miles; Party III, 1 observer, 6 hours, 8 miles; Party IV, 2 observers, 5 hours, 7 miles; Party V, 1 observer, 5½ hours, 7 miles; Party VI, 1 observer, 8 hours, 10 miles; Party VII, 3 observers, 7 hours, 9 miles. Total miles afoot, 52½; total hours, 42. American Golden-eye, 87; American Common Merganser, 9; Eastern Sparrow Hawk, 1; Ruffed Grouse, 4; Common Pheasant, 1; Herring Gull, 1; Rock Dove, 22; Hairy Woodpecker, 6; Downy Woodpecker, 15; Blue Jay, 9; American Crow, 5; Black-capped Chickadee, 49; White-breasted Nuthatch, 23; Red-breasted Nuthatch, 2; Brown Creeper, 2; Golden-crowned Kinglet, 1; Common Starling, 730; English Sparrow, 756; Redpolled Linnet, 55; Pine Siskin, 20; American Goldfinch, 129. Total, 21 species, 1,927 individuals. — *Ottawa Field-Naturalists' Club.*

Observers: R. M. ANDERSON, F. E. BANIM, R. F. CLARKE, R. E. DELURY, B. A. FAUVEL, T. S. HENNESSY, C. E. JOHNSON, W. H. LANCELEY, HARRISON F. LEWIS, HOYES LLOYD.

SOUTH MARCH, CARLETON CO., ONT.—December 27, 1940; 8.53 a.m. to 3.40 p.m. Cloudiness 100%, 8 in. crusted snow, occasional light westerly wind, temp. 32° at 9.00 a.m., maximum 35°. Observers together; 13 miles afoot; 6 hours, 47 minutes. Ruffed Grouse, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; Downy Woodpecker, 3; Blue Jay, 4; Black-capped Chickadee, 23; White-breasted Nuthatch, 5; Red-breasted Nuthatch, 1; Brown Creeper, 1; Golden-crowned Kinglet, 2; English Sparrow, 13; Pine Grosbeak, 2; Redpolled Linnet, 3. Total, 13 species, 60 individuals.—B. McL. LEWIS, C. R. LEWIS, HARRISON F. LEWIS.

PAKENHAM, LANARK CO., ONT.—December 24, 1940; 8.00 a.m. to 12.15 p.m. and 1.00 p.m. to 3.30 p.m. Fair, bright sunshine, no wind. Visibility and hearing excellent. 10 in. snow; temp. 8° at start, 25° at return. Observers separate; two working in the morning, two in the afternoon. 15 miles on foot. American Golden-eye, 3; Canada Ruffed Grouse, 11; Eastern Hairy Woodpecker, 5; Northern Downy Woodpecker, 3; Arctic Three-toed Woodpecker, 1, Blue Jay, 10; Black-capped Chickadee, 16; White-breasted Nuthatch, 8; Red-breasted Nuthatch, 1, Eastern Golden-crowned Kinglet, 2; Common Starling, 11; English Sparrow, 74; Canadian Pine Grosbeak, 5; Common Redpoll, 3; Pine Siskin, 2; White-winged Crossbill, 12. Total, 16 species, 167 individuals. Seen recently: Dec. 7, Evening Grosbeak, 10; Dec. 8, Snow Bunting, flock of 45; Dec. 23, Brown Creeper, 2.—ALLAN F. ROSS, E. G. ROSS, WILMER ROSS.

TORONTO, ONT.—December 22, 1940; 8.00 a.m. to 5.00 p.m. Cloudy; wind light, southwest to northwest; 4 in. old snow; temp. max. 39°, min. 34°. 46 observers in 7 parties. Horned Grebe, 1; Gadwall, 1; Green-winged Teal, 1; Greater Scaup Duck, 1,037; American Golden-eye, 265; Buffle-head, 11; Old-squaw, 449; White-winged Scoter, 1; Ruddy Duck, 1; Hooded Merganser, 1; American Common Merganser, 58; Sharp-shinned Hawk, 1; Eastern Red-tailed Hawk, 1; Red-shouldered Hawk, 1; Eastern Sparrow Hawk, 7; Ruffed Grouse, 9; Common Ring-necked Pheasant, 85; Great Black-backed Gull, 18; Herring Gull, 1,984; Ring-billed Gull, 3; Eastern Screech Owl, 2; Great Horned Owl, 1; American Long-eared Owl, 1; Short-eared Owl, 2; Eastern Belted Kingfisher, 2; Northern Flicker, 1; Red-headed Woodpecker, 1; Eastern Hairy Woodpecker, 6; Northern Downy Woodpecker, 58; Blue Jay, 57; Eastern Crow, 5; Black-capped Chickadee, 129; White-breasted Nuthatch, 42; Red-breasted Nuthatch, 1; Brown Creeper, 35; Eastern Winter Wren, 1; American Robin, 4; Eastern Golden-crowned Kinglet, 18; Cedar Waxwing, 80; Northern Shrike, 5; Common Starling, 1,625; English Sparrow, 1,300; Eastern Red-wing, 2; Eastern Cardinal, 10; Evening Grosbeak, 1; Eastern Purple Finch, 17; Redpolled Linnet, 688; Pine Siskin, 139; American Goldfinch, 28; White-winged Crossbill, 30; Slate-coloured Junco, 27; Tree Sparrow, 239; Song Sparrow, 23. Total, 53 species, 8,515 individuals. —*The Brodie Club* (per R. G. Rutter, *Secretary.*)

Observers: J. L. BAILLIE, F. BANFIELD, D. BEACHAM, R. E. BENNETT, E. M. BOISSONNEAU, C. E. BOND, G. BRITTON, A. F. COVENTRY, J. CROSBY, F. S. DINGMAN, R. G. DINGMAN, W. S. DINGMAN, I. ELLIS, B. FALLS, W. W. H. GUNN, C. E. HOPE, G. LAMBERT, A. LAWRIE, J. LINK, J. LIVINGSTON, J. MACARTHUR, D. MACDONALD, T. F. MCILWRAITH, W. MANSELL, D. MILLER, W. MILLS, C. MOLONY, L. A. PRINCE, C. PROCTOR, R. RITCHIE, R. J. RUTTER, J. SATTERLY, R. SAUNDERS, E. SHORE, T. M. SHORTT, F. SMITH, L. L. SNYDER, H. H. SOUTHAM, T. SWIFT, S. L. THOMPSON, G. C. TONER, N. TRENCHARD, R. D. USSHER, J. WALTY, D. WEST, R. B. WOOTTON.

HAMILTON, ONT. (Dundas Valley west to Ancaster, Hamilton and Harbor, Stoney Creek, Aldershot, Lake Medad, Burlington, Bronte).—December 22, 1940; 8.00 a.m. to 5.30 p.m. Overcast; ground soggy; harbor open; wind light, southwest; temp. 36° to 42°. Twenty-four observers working in ten parties and at four separate feeding stations. Total party hours afield, 67; total party miles afoot, 130. Common Loon, 2; Horned Grebe, 4; Great Blue Heron, 4; Mallard Duck, 10; Black Duck, 273; Baldpate, 1; Pintail, 2; Blue-winged Teal, 1 (Ken Hannigan); Greater Scaup Duck, 510; Lesser Scaup Duck, 1; American Golden-eye, 442; Buffle-head, 14; Old-squaw, 5; White-winged Scoter, 6; Surf Scoter, 1 (G.W.N.); American Common Merganser, 840; Red-breasted Merganser, 45; American Goshawk, 1; Cooper's Hawk, 2; Red-tailed Hawk, 3; Marsh Hawk, 1; American Sparrow Hawk, 2; Ruffed Grouse, 33; European Gray Partridge, 51; Common Pheasant, 166; American Coot, 1; Great Black-backed Gull, 98; Herring Gull, 5,100; Ring-

billed Gull, 57; Bonaparte's Gull, 34; American Screech Owl, 2; Great Horned Owl, 4; American Long-eared Owl, 1; Belted Kingfisher, 2; Northern Flicker, 6; Hairy Woodpecker, 14; Downy Woodpecker, 55; Eastern Phoebe, 1 (Bob Elstone); Blue Jay, 43; American Crow, 15; Black-capped Chickadee, 123; White-breasted Nuthatch, 39; Brown Creeper, 18; American Robin, 1; Golden-crowned Kinglet, 15; Cedar Waxwing, 71; Common Starling, 1,103; English Sparrow, 1,331; Cowbird, 3; Cardinal, 29; Common Purple Finch, 7; Common Redpoll, 238; Pine Siskin, 6; American Goldfinch, 127; Slate-coloured Junco, 189; Tree Sparrow, 372; Swamp Sparrow, 2; Song Sparrow, 43; Snow Bunting, 37. Total, 59 species, approximately 11,607 individuals.—DON NEIL, and R. D. F. BOURNE, F. H. BUTCHER, JACK AND BILL CAMPBELL, BOB ELSTONE, MRS. J. G. FARMER, KEN HANNIGAN, DON HASSELL, OLIVER HEWITT, H. E. KETTLE, MISSES J. MAGEE, E. MALCOLM, JACK MARTIN, MRS. J. P. MORTON, DR. AND MRS. G. O. MCMILLAN, G. W. NORTH, BLAIR RONALD, G. SACKRIDER, MISS L. STEWART, BILL WALKER, J. H. WILLIAMS (members *Hamilton Bird Protection Society, Inc.*)

KITCHENER-WATERLOO, ONT. — December 28, 1940. Sky cloudy; raw east wind; snow very wet underfoot. 5 observers with some other individuals. Two large wooded areas each about 3 miles from town were visited. The poorest census in years, birds being driven to cover by the weather. Ducks (flying—not identified), 8; Ruffed Grouse, 2; Common Pheasant, 1; Gulls (sp. ?), 10; Downy Woodpecker, 2; Blue Jay, 2; Black-capped Chickadee, 10; White-breasted Nuthatch, 1; Pine Siskin, 7; Slate-coloured Junco, 4; Tree Sparrow, 2. Total, 11 species, 49 individuals.—MARY CONNER (*Kitchener-Waterloo Field-Naturalists' Club*).

LONDON, ONT.—December 26, 1940. Sky overcast, light drizzle turning to heavy fog about 11.00 a.m., making observations difficult. Temperature fairly constant throughout the day at about 44°. No wind; ground practically free of snow. Territory covered mostly valley of Thames River, one or two spruce swamps and five private feeding stations. Twenty-eight observers in fourteen parties, mostly out in the morning only. Total party hours afield—56 (all afoot). Total party miles—50 (all afoot). Great Blue Heron, 2; Black Duck, 2; American Golden-eye, 36; American Common Merganser, 42; Cooper's Hawk, 1; Red-tailed Hawk, 4; Bald Eagle, 1; American Sparrow Hawk, 1; Ruffed Grouse, 1; Bob-white, 8; Common Ring-necked Pheasant, 23; Herring Gull, 53; Ring-billed Gull, 3; Mourning Dove, 1; American Screech Owl, 1; Great Horned Owl, 4; Belted Kingfisher, 8; Yellow-shafted Flicker, 1; Hairy Woodpecker, 3; Downy Woodpecker, 42; Blue Jay, 47; American Crow, 47; Black-capped Chickadee, 157; White-breasted Nuthatch, 36; Brown Creeper, 6; Winter Wren, 1; American Robin, 1; Golden-crowned Kinglet, 20; Cedar Waxwing, 2; Common Starling, 40; English Sparrow, 46; Cardinal, 48; Common Purple Finch, 1; Common Redpoll, 160; Pine Siskin, 157; American Goldfinch, 45; Slate-coloured Junco, 38; Tree Sparrow. 66; Song Sparrow, 3. Total, 39 species, 1,158 individuals. Seen recently: Common Rough-legged Hawk; Snowy Owl; White-winged Crossbill; Eastern Towhee. *Observers*: MRS. BIGELOW, R. BROWN, D. CARR, D. CHRISTIE, DR. G. CUMMINGS, ELI DAVIS, K. FETHERSTON, M. FETHERSTON, H. GIRLING, R. HEDLEY, J. HIGGINS, W. JARMAIN, W. LOTT, H. MACMAHON, C. MADDEFORD, L. MARSH, E. H. MCKONE, J. C. MIDDLETON, MRS. MORRIS, W. MORRIS, DR. W. E. SAUNDERS, D. SUTTON, P. SUTTON, MRS. THEODIE, W. THOMPSON, R. WESTCOTT, J. WRIGHT, R. STANDFIELD (*McIlwraith Ornithological Club*).

CHATHAM, ONT. (Mitchell's Bay, Bradley's Marsh on Lake St. Clair, Jeannette's Creek, Thames River Valley, south of river, from Chatham to Thamesville, Chatham to Blenheim and Erieau)—December 31, 1940; 8.15 a.m. to 6.00 p.m. Sky overcast; 1 in. snow; temp. max. 32°; wind west in a.m., northeast in p.m. 6 observers in 3 parties, 2 all day, 1 in morning only. Great Blue Heron, 4; Mallard Duck, 2; Black Duck, 230; American Golden-eye, 11; American Common Merganser, 6; Cooper's Hawk, 2; Red-tailed Hawk, 18; Common Rough-legged Hawk, 8; Marsh Hawk, 1; Bob-white, 9; Common Pheasant, 1; American Coot, 14; Herring Gull, 85; Ring-billed Gull, 75; Bonaparte's Gull, 5; Rock Dove, 34; Mourning Dove, 1; American Long-eared Owl, 5; Northern Flicker, 1; Hairy Woodpecker, 25; Horned Lark, 2; Blue Jay, 23; American Crow, 860+; Black-capped Chickadee, 9; White-breasted Nuthatch, 7; Brown Creeper, 4; Golden-crowned Kinglet, 3; Common Starling, 600+; English Sparrow, 1,090+; Bronzed Grackle, 2; Cardinal, 34; Common Purple Finch, 1; Common Redpoll, 2; American Goldfinch, 41; Slate-coloured Junco, 68; Tree Sparrow, 430+; White-throated Sparrow, 1; Swamp Spar-

row, 2; Song Sparrow, 15; Snow Bunting, 1. Total, 41 species, 3,735+ individuals. Seen recently: American Robin, 1; Red-winged Blackbird, 25; Cowbird, 25.—C. M. ANDERSON, D. A. ARNOTT, C. H. HAND, WILLIAM ILLMAN, GEO. M. STIRRETT, A. A. WOOD (*Kent Nature Club*).

MEAFORD, ONT. (East half of the town of Meaford and the shore 2 mi. east from Meaford)—December 27, 1940. Very dull and mild. 10 observers in 1 party. American Golden-eye, 3; Buffle-head, 1; American Common Merganser, 4; Ruffed Grouse, 9; Herring Gull, 85; Great Horned Owl, 2; Blue Jay, 18; American Crow, 1; Black-capped Chickadee, 27; White-breasted Nuthatch, 3; Cedar Waxwing, 420; Common Starling, 45; English Sparrow, 72; Cardinal, 2; Redpolled Linnet, 35; Tree Sparrow, 5. Total, 16 species, 732 individuals. 1 Red-throated Loon found dead.—L. H. BEAMER.

FORT WILLIAM—PORT ARTHUR, ONT. (Lower Kaministiquia valley and area 15 mi. west, to Kakabeka Falls)—December 28, 1940; 9.30 a.m. to 4.00 p.m. Clear; 8 in. snow on ground; temp. 22° to 28°. 8 observers in 2 parties; 60 miles by auto, 10 miles on foot. Ruffed Grouse, 2; Iceland Gull, 1; Herring Gull, 200; Rock Dove, 8; Hairy Woodpecker, 2; Downy Woodpecker, 1; Arctic Three-toed Woodpecker, 1; Canada Jay, 2; Blue Jay, 4; American Crow, 6; Black-capped Chickadee, 11; Red-breasted Nuthatch, 6; Common Starling, 105; English Sparrow, 23; Evening Grosbeak, 6; Pine Grosbeak, 20; Common Redpoll, 28. Total, 17 species, 426 individuals. White-winged Crossbill, 12, and Hudsonian Chickadee, 3, were observed on December 26 (C.E.G.) —*Thunder Bay Field-Naturalists' Club.*

Observers: A. E. ALLIN, R. BABION, D. BECKETT, C. E. GARTON, K. HUTTON, J. S. LOWCOCK, B. WESTON, F. P. WOODWARD.

CRESCENT, B. C. (Coastline from the Peace Arch at the International Boundary, by White Rock and Ocean Park to Crescent Beach, also some bush and cleared land in same area)—December 27, 1940; 9.00 a.m. to 4.30 p.m. Some sunshine; wind southwest; temp. 42° to 48°. 4 observers together. 8 miles by car, 10 miles on foot. Common Loon, 9; Horned Grebe, 13; Western Grebe, 1; White-crested Cormorant, 1; Northwest Coast Heron, 4; Black Brant, 100+; Mallard Duck, 21; American Pintail, 1; Canvasback, 50; Greater Scaup Duck, 51; American Golden-eye, 16; Buffle-head, 26; Western Harlequin Duck, 7; White-winged Scoter, 56; Surf Scoter, 39; Ruddy Duck, 1; Red-breasted Merganser, 2; Desert (?) Sparrow Hawk, 1; Glaucous-winged Gull, 53; Short-billed Gull, 300+; Pigeon Guillemot, 1; Short-eared Owl, 1; Western Belted Kingfisher, 2; Northwestern Crow, 6; Oregon Chickadee, 5; Western Winter Wren, 1; Seattle Wren, 1; Pacific Varied Thrush, 2; Ruby-crowned Kinglet, 1; Oregon Towhee, 4; Oregon Junco, 42; Lincoln's (?) Sparrow, 2; Rusty Song Sparrow, 11. Total, 33 species, 831+ individuals. Also found 1 dead Red-throated Loon and 1 dead Short-eared Owl. No shorebirds on account of high tides.—MARTIN W. HOLDOM, ALDAH W. HOLDOM, MARY W. HOLDOM, FRANCES E. L. HOLDOM.

COURTENAY TO COMOX, VANCOUVER ISLD., B.C. (river and shore line with side trips)—December 27, 1940; 9.00 a.m. to 4.00 p.m. Dull; calm in a.m., strong east wind after 1.00 p.m.; temp. 38° at start, 46° at return. Observers together, 8 miles on foot. Lesser Loon, 4; Horned Grebe, 2; Red-throated Loon, 1; Holboell's Grebe, 6; 2; Western Grebe, 5; Double-crested Cormorant, 5; Pelagic Cormorant, 1; Heron (sp. ?), 2; Black Brant, 4; Mallard Duck, 100+; Baldpate, 250+; Pintail, 3; Greater Scaup Duck, 150+; American Golden-eye, 150+; Buffle-head, 50+; Harlequin Duck, 2; White-winged Scoter, 500+; Surf Scoter, 500+; American Scoter, 10; Hooded Merganser, 3; American Common Merganser, 12; Redbreasted Merganser, 3; Oregon Ruffed Grouse, 1; Common Pheasant, 4; American Coot, 80+; Killdeer Plover, 80+; Red-backed Sandpiper, 40 (est.); Glaucous-winged Gull, 450+; Thayer's Gull, 2; Short-billed Gull, 750+; Flicker (sp.?), 10; Pileated Woodpecker, 1; Steller's Jay, 4; Raven, 3; Western Crow (identified by note), 1; Northwestern Crow, 150+; Winter Wren, 12; Seattle Wren, 3; American Robin, 1; Varied Thrush, 1; English Sparrow, 15; Meadowlark (sp. ?), 2; Brewer's Blackbird, 150 (est.); Pine Siskin, 125 (est.); Red Crossbill, 18; Oregon Towhee, 3; Oregon Junco, 15; Rusty Song Sparrow, 21. Total, 47 species (Crow represented by 2 subspecies), 3,705+ individuals, 2 species introduced. Winter so far very mild; heavy rains recently; partially flooded fields provide excellent feeding grounds for Gulls (especially Short-billed) and Killdeers—the last-named present in record numbers for this district at this season. Absence of Chickadees noticeable, but in accord with general evidence of their scarcity.—A. R. DAVIDSON, B. HUGHES, THEED PEARSE.

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VOL. LV, No. 3 MARCH, 1941

THE CANADIAN FIELD-NATURALIST

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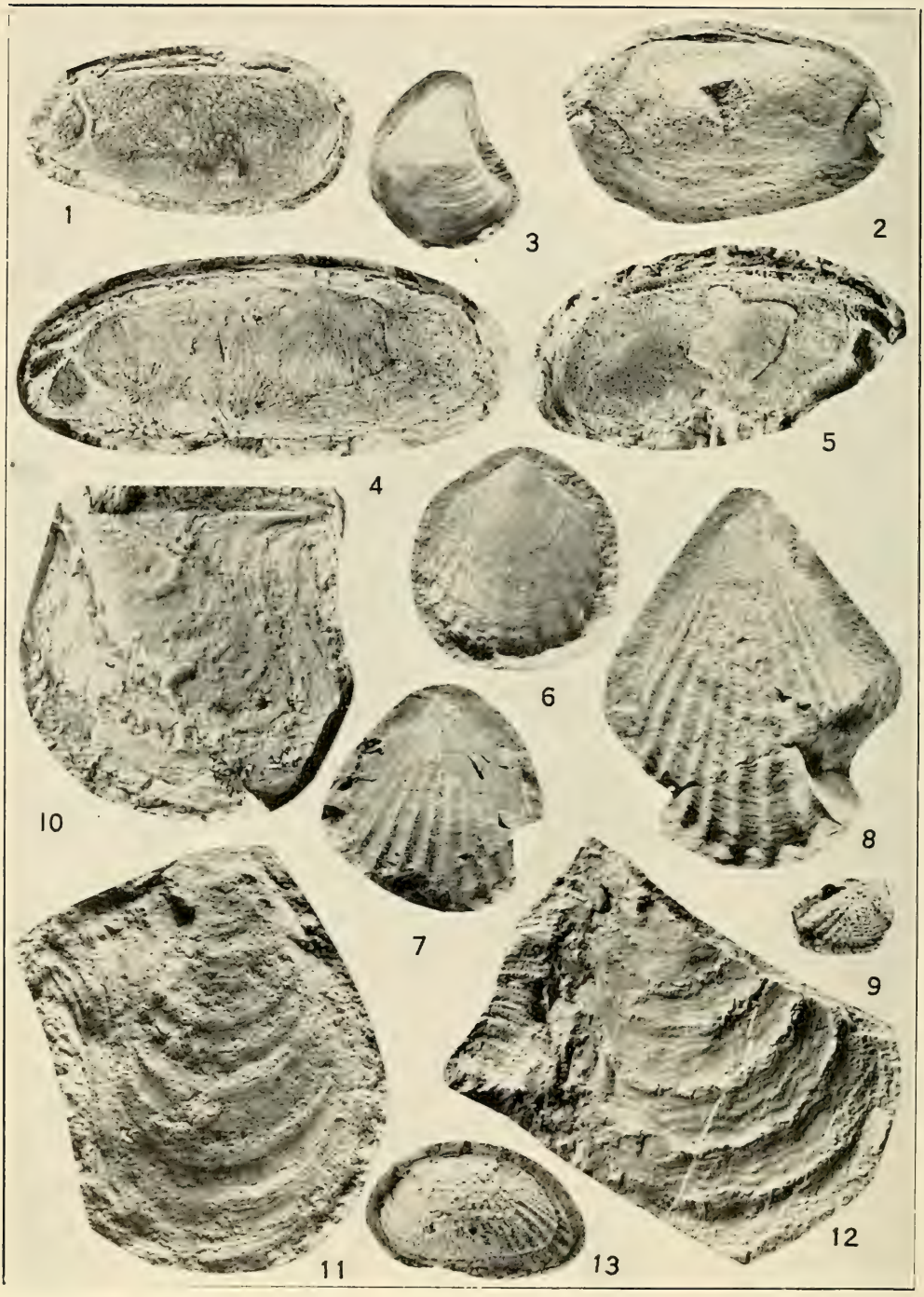
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The Canadian Field-Naturalist

VOL. LV 35,343 OTTAWA, CANADA, MARCH, 1941 No. 3

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PRELIMINARY DESCRIPTIONS OF SOME NEW TRIASSIC PELECYPODS FROM THE PEACE RIVER FOOTHILLS, B.C.*

By F. H. McLEARN

TEN NEW species and varieties of pelecypods, some very close to European species, are described in the following pages. The generic assignment of some is difficult and some generic revision may be required later. All of the new forms, however, merit description on account of their stratigraphic value.

The type specimens are in the collections of the Geological Survey at Ottawa.

Pteria? *laksel* n. sp.

Plate I, figure 3

The left value of the holotype is moderately convex and oblique in outline. The posterior ear is fairly large and has a concave, posterior margin. The anterior ear of the holotype is not well preserved, but in another specimen it is small and only slightly differentiated from the remainder of the shell. The surface has low folds and varices of growth. A much larger specimen than the holotype has a similar outline and a large posterior ear with a concave, posterior margin. Compared with the left valve of *Avicula* ? *difficilis* Bittner, our species is not so convex, the posterior ear is larger and the anterior ear is not so well defined.

This species has been previously listed as *Pteria* ? cf. *difficilis* Bittner.

Name. *Laksel,* the Raven phatry of the Sekani tribe.

Type. The holotype, cat. no. 8763, is from near the base of the *Halobia* zone on McLay spur.

Aviculomyalina ? *williamsi n. sp.*

Plate I, figures 10 to 12

The outline of this somewhat convex species is higher than long, somewhat oblique and somewhat extended postero-ventrally. The surface is flattened in the postero-dorsal part of the shell, forming there a poorly delimited "wing" which is somewhat mucronate and emarginate posteriorly, particularly in half grown specimens. The surface is covered with concentric ridges which in well preserved specimens are elevated in a wavy or curved ornament. The broad, shallow furrows between the ridges bear fine, curved or wavy, concentric costae. There is probably some variation in this surface ornament, but its extent cannot be measured until more well preserved specimens are obtained. There is a narrow ridge of variable length close to the dorsal border, on the posterior "wing."

This species has been listed as *Aviculomyalina* cf. *lata* Assmann in a previous publication.

It is larger than *Aviculomyolina lata* Assmann, is more mucronate posteriorly and has a more elaborate surface ornament. The generic position is uncertain, as the hinge and ligament are not preserved. It is placed provisionally in *Aviculomyalina,* because of its resemblance to *A. lata.*

Name. In honour of Dr. M. Y. Williams.

Types. The holotype, cat. no. 8764 and the paratype, cat. no. 8769, are from the *poyana* zone on Pardonet hill; the paratype, cat. no. 8774, is from talus of the same zone on Pardonet hill.

Myophoria (*Elegantinia*) *grahami* n. sp.

Plate I, figure 9

This small, moderately convex species is much longer than high, has an area of moderate width and a high, narrow, nearly straight keel. Anterior to the keel the surface is ornamented with concentric, even, fine costae, crossed in front o fthe keel by three, long, radial costae and two, much shorter and finer costae. The ornament of the area is not so distinct, but it

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has, at least, closely spaced, fine costae, parallel to the growth lines. The dentition is not known.

Trigonia margaritifera Boehm has a shorter outline, a more curved keel and fewer radial costae, anterior to the keel. *Myophoria heslingtonensis* Trechmann has a shorter and higher outline and more radial costae, which begin at a greater distance from the keel than in the Peace River species.

Name. The species name is in honour of the late Doctor Roy Graham.

Type. The holotype, cat. no. 8776, is from the *Halobia* zone in Lima gully, Pardonet hill.

Pecten chiwanae n. sp.
Plate I, figure 7

The holotype, a left valve, is moderately convex and higher than long. The surface is ornamented with about twelve, radial, rather angular ribs, separated by wide, shallow furrows. There is an additional, very fine, divaricate ornament, forming in part, by intersection, an interlaced pattern, particularly well developed on the antero-central part of the body of the shell; this ornament becomes indistinct in the umbonal region. The ears have only a very fine concentric ornament.

The ornament in shells like *Pecten* (*Indopecten*) *clignetti* Boehm, has a zigzag, not an interlaced-divaricate, pattern.

Name. *Chiwan,* an Indian proper name.

Type. The holotype, cat. no. 8786, is from the Mahaffy Cliffs fauna on Mahaffy cliffs.

Pecten sasuchan n. sp.
Plate I, figure 6

The holotype, a right valve, is higher than long, fairly convex and is ornamented with low, but fairly wide, rounded folds, hardly noticeable on the dorsal part of the shell, but well defined ventrally. In addition, there is a very fine, divaricate and mesh-like ornament, as in *Pecten chiwanae* n. sp. on the central part of the shell and a *Camptonectes*-like pattern on the anterior and posterior borders. The ears appear to have only fine, concentric ornament. This species has lower, wider and more rounded ribs than *Pecten chiwanae.*

Name. *Sasuchan,* a band of Sekani Indians.

Type. The holotype, cat. no. 8787, is from the *poyana* zone on Pardonet hill.

Lima (*Limatula*) *childerhosei,* n. sp.
Plate I, figure 8

The valves are approximately equal, nearly bilaterally symmetrical, somewhat compressed and much higher than long. The surface is ornamented with radial, rather angular and somewhat rugose, strong ribs, which are finer on the margins than on the middle of the shell and very fine on the ears. The outline is more symmetrical and the ribs somewhat more numerous and less curved than in *Limea* ? *protei* Munster.

Name. In honour of A. J. Childerhose.

Type. The holotype, cat. no. 8788, is from talus of the *poyana* zone on Pardonet hill.

Myoconcha curionii var. *montipetraea* n. var.

Plate I, figure 5

This is a fairly large, fairly convex, elongate species with the maximum height in the posterior part of the shell, with no appreciable flattening or sulcus anterior to the evenly rounded, postumbonal slope, with a slightly rounded, dorsal margin, a rounded, obliquely truncate, posterior margin and a very narrow escutcheon. The surface has irregular varices of growth. The somewhat pointed, anterior adductor scar is deeply excavated and undercut dorso-anteriorly into the anterior margin of the shell and in the left valve is bordered dorsally and anteriorly by a curved ridge. Dorsal to the muscle scar is the flat surface of the thickened interior margin. Near the posterior end of the hingeline of the left valve is a short tooth socket. The ligamental groove is not well preserved in available specimens, but appears to extend almost one half of the length of the hinge line. The interior of the right valve of this variety is unknown.

The outline is more narrowed anteriorly than in the original figures of Hauer, published in 1857. There is considerable resemblance, however, to specimens figured by Bittner (Waagen ?) in 1907 (pl. 32, figs. 6, 7); but the outline is apparently not so obliquely truncate posteriorly nor is the anterior border so abruptly rounded.

Name. *Mons,* mountain; *petraeus,* rocky.

Type. The holotype, cat. no. 8790 (holoplastotype, cat. no. 8790a), is from talus below Barren gully, Pardonet hill.

Myoconcha curionii var. *chenekai* n. var.
Plate I, figure 4

The shells of this variety are relatively longer in outline than those of *Myoconcha curionii* var. *montipetraea* n. var.

The interior of the right valve is well pre-

served in the holotype of this variety. The anterior adductor muscle scar is deeply excavated out of the thickened margin of the shell and is undercut on its antero-dorsal side. There is a sloping ridge just anterior to this scar and another sloping ridge, or tooth, dorsal to this muscle scar. The deep, ligamental groove extends backwards for nearly half the length of the hingeline. The escutcheon is narrow.

Name. *Cheneka,* an Indian proper name.

Type. The holotype, cat. no. 8794 (holoplastotype, cat. no. 8794a) is from talus collected below Barren gully on Pardonet hill and possibly from the *poyana* zone.

Myoconcha amnipacis n. sp.
Plate I, figures 1, 2

The right valve is fairly convex, much longer than high and the maximum height is posterior to the middle of the shell. The postumbonal slope is evenly rounded and the surface in front of it is somewhat flattened or even slightly concave. The hingeline is long, nearly straight, the anterior margin short, rounded and forward sloping, the ventral margin gently rounded to nearly straight and the posterior margin is gently rounded and slopes anteriorly. The anterior adductor scar is large, somewhat pointed above and bounded posteriorly by a curved ridge. The surface is not well preserved, but is known to have varices of growth.

The interior is considerably different from that of *Myoconcha curionii* Hauer and, in particular, the anterior adductor muscle scar is larger proportional to the size of the specimen. The outline is much like that of *Myoconcha curionii* var. *meriani* Stoppani but is more narrowed anteriorly.

Name. *Amnis,* a river; *pax,* peace.

Type. The holotype, cat. no. 8795, is from talus of the Mahaffy Cliff fauna in Mahaffy cliffs and the paratype, cat. no. 8797 (paraplastotype, cat. no. 8797a) is from the same fauna, in situ, at the same locality.

Palaeocardita glaukos n. sp.
Plate I, figure 13

This species is only moderately convex, is much longer than high, has the beaks near the anterior end, has a somewhat broadly curved hingeline, rounded anterior and ventral margins and an obliquely truncate and broadly rounded, posterior margin. The numerous, fine, radial costae are coarser on the postumbonal slope than on other parts of the shell.

The Alpine species, *Cardita latemarensis* Phillip is smaller and has fewer costae, more uniform in size.

Name. *Glaukos,* a sea god.

Types. The holotype, cat. no. 8798 (holoplastotype, cat. no. 8798a), is from talus, possibly of the *poyana* zone, below Barren gully, on Pardonet hill.

NOTE

The catalogue number of the holotype of *Juvavites* (*Gonionotites*) *rarus* McLearn, erroneously recorded as 8833 in a previous publication, is 8830. The catalogue number 8833 pertains solely to the holotype of *Juvavites* (*Dimorphites*?) *pardonetiensis* McLearn.

PLATE I

Figure 1. *Myoconcha amnipacis* n. sp. Paraplastotype. Geol. Surv. colls., cat. no. 8797a.

Figure 2. *Myoconcha amnipacis* n. sp. Holotype. Geol. Surv. colls. cat. no. 8795.

Figure 3. *Pteria* ? *laksel* n. sp. Holotype. Geol. Surv. colls., cat. no. 8763.

Figure 4. *Myoconcha curionii* var. *chenekai* n. var. Holoplastotype. Geol. Surv. colls., cat. no. 8794a.

Figure 5. *Myoconcha curionii* var. *montipetraea* n. var. Holoplastotype. Geol. Surv. colls., cat. no. 8790a.

Figure 6. *Pecten sasuchan* n. sp. Holotype. Geol. Surv. colls., cat. no. 8787.

Figure 7. *Pecten chiwanae* n. sp. Holotype. Geol. Surv. colls., cat. no. 8786.

Figure 8. *Lima* (*Limatula*) *childerhosei* n. sp. Holotype. Geol. Surv. colls., cat. no. 8788.

Figure 9. *Myophoria* (*Elegantinia*) *grahami* n. sp. Holotype. Geol. Surv. colls., cat. no. 8776.

Figure 10. *Aviculomyalina williamsi* n. sp. Holotype. Geol. Surv. colls., cat. no. 8764.

Figure 11. *Aviculomyalina williamsi* n. sp. Paratype. Geol. Surv. colls., cat. no. 8774.

Figure 12. *Aviculomyalina williamsi* n. sp. Paratype. Geol. Surv. colls., cat. no. 8769.

Figure 13. *Palaeocardita glaukos* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 8798a.

ON SOME BIRDS FROM GRAND MANAN, NEW BRUNSWICK

By JAMES BOND

THE FOLLOWING notes on certain land-birds breeding on Grand Manan will supplement Mr. Olin Pettingill's very useful account, *The Bird Life of the Grand Manan Archipelago* (Proc. Nova Scotian Inst. of Sci. vol. 19, pt. 4, 1939). Mr. Pettingill lists (page 311) 74 species that are definitely known to nest here. To these can be added the following fourteen :—

RED-BREASTED MERGANSER (*Mergus serrator*).—Brood seen at Jack's Cove, Ross Island, in 1938 by Getchell Lambert, according to Allan Moses.

EASTERN GOSHAWK (*Astur atricapillus*).—Nest with three downy young and one egg found at Laborie Hill by Ralph Griffin in early May, 1939.

BROAD-WINGED HAWK (*Buteo platypterus*).—(Pettingill).

DUCK HAWK (*Falco peregrinus*).—Nest with four young found on the cliffs known as "Seven Days Work" by Ralph Griffin in 1938.

NIGHT HAWK (*Chordeiles minor*).—Young once found at Eel Lake by Allan Moses.

CHIMNEY SWIFT (*Chaetura pelagica*).—Nests found at North Head by Moses.

RUBY-THROATED HUMMING BIRD (*Archilochus colubris*).—Nest found by George Griffin, according to Moses.

EASTERN KINGBIRD (*Tyrannus tyrannus*).—Four or five nests found by Moses.

CATBIRD (*Dumetella carolinensis*).—Nest containing five eggs found at Whale Cove Swamp by Moses.

NASHVILLE WARBLER (*Vermivora ruficapilla*).—Nest and eggs found by Moses at Fish Head.

CHESTNUT-SIDED WARBLER (*Dendroica pensylvanica*).—Nest and eggs found by George Griffin in a raspberry bush at North Head, according to Moses.

PURPLE FINCH (*Carpodacus purpureus*).—Nest and eggs found by George Griffin, according to Moses.

RED CROSSBILL (*Loxia curvirostra*).—Twenty nests found by Moses one day in August, 1906, the same year that Mr. Tufts found so many nests of the species near Wolfville, Nova Scotia; but there were no White-winged Crossbills in the Grand Manan breeding colony. Mr. Moses has not known this bird to breed here before or since.

CHIPPING SPARROW (*Spizella passerina*).—Nests and eggs found by Moses; this bird was fairly common and widespread on Grand Manan in 1939.

To Pettingill's list of birds that probably breed in the Archipelago should be added the Ruby-crowned Kinglet (*Corthylio calendula*), Wilson's Warbler (*Wilsonia pusilla*) and the Tennessee Warbler (*Vermivora peregrina*), all of which I saw during my stay on Grand Manan from June 17 to 26, 1939. I showed one Tennessee Warbler to Mr. Moses who collected the specimen on June 21, and who now has it in his collection. This species was considered of hypothetical occurrence on Grand Manan by Pettingill although it was recorded from the island by Herrick. Mr. Moses has lately seen the Tennessee Warbler on several occasions during spring migration. I located three singing males in 1939.

Neither Mr. Moses nor I can agree with Pettingill that the Black-polled Warbler (*Dendroica striata*) can be called common on Grand Manan There is a thriving colony in the Ingall's Head Bog and two singing males were located in Dakin's Swamp, adjoining "The Thoroughfare", during my visit. Not a single individual of this species was found anywhere west of the Northern Head—Southern Head road. In fact, most of the territory on Grand Manan is utterly unsuited for this species. We doubt if the Black-poll Warbler was ever abundant on Grand Manan, and suggest that the seventeen sets of eggs in the Norris Collection, said to have been collected here, were taken on one of the outlying islands, probably Kent Island where the bird is abundant and whence collections of bird's eggs were formerly sold, according to Moses. Perhaps Audubon's "Eastport" nest was in reality taken on Whitehead Island which he visited in 1833. I don't believe a single pair of Black-polls nests on the coast of Maine proper at the present time, although an occasional individual has been found in Summer on some of the outer islands off the Maine coast, such as Monhegan and Little Duck.

Among the more interesting birds that I found on Grand Manan were the Richardson's Owl (*Cryptoglaux funerea*) and the Lincoln and Acadian Sparrows (*Melospiza lincolni* and *Ammospiza caudacuta*). The Owl was heard by Mr. Moses and myself in the early morning of June 23 near Watt Pond. Here was located the Lincoln Sparrow, but we found none in the Ingall's Head

bog where I saw at least two males in full song during the latter part of June 1933 (not in the Castalia Marshes as stated by Pettingill).

Brooks has stated (Canad. Field-Nat., 47, 1933, page 71) in regard to Marsh Wrens that "certainly none breed" on Grand Manan. But it might be mentioned that I found the Short-billed Marsh Wren (*Cistothorus stellaris*) breeding commonly on the adjacent mainland (Washington County, Maine), within sight of Grand Manan.

THE MUSSELS (Unionidae) OF THE MOIRA RIVER IN HASTINGS COUNTY, ONTARIO

By REV. H. B. HERRINGTON

FOR SOME time I have observed freshwater mussels in the Moira River drainage of Hastings County, Ontario, particularly with respect to their ecology and distribution. To the present time only portions of this drainage have been visited. Early in the course of the work it became obvious that this river is unique in that its naiades belong to two distinct and highly characteristic faunal groups, namely, the Atlantic and the Mississippi fauna. An examination of the literature reveals that very little exact information is available regarding the mussels in this zone of transition. In the following discussion some information will be presented bearing on ecology, distribution, relation of the faunal elements to glacial history, and variation among species.

With an area of approximately 2,500 square miles, Hastings County is drained primarily by the Moira River. The Trent River flows only through about fifteen miles of the southwestern portion of this county, while in the extreme north there are tributaries that flow northward to the Ottawa River. The course of the Moira River itself somewhat parallels in general outline that of the lower reach of the Trent River. Both rivers empty into the Bay of Quinte and are faunistically and geologically associated with the Trent River system. This condition will be shown later to have an important bearing on the origin of the naiad fauna. Approximate distances up-stream from the Bay of Quinte of stations in the Moira River drainage are as follows:

Flat Rock	25 miles
East of Thomasburg	26 "
East of Chapman's Corners	29 "
Outlet of Big Bay of Stoco Lake	30 "
Stoco Lake	31 "
White Lake (connected by creek)	45 "
Skootamatta River	39 "
Black River	40 "
Moira Lake	43 "
Wolf Lake	80 "

Water analyses at several stations in the Moira River drainage reveal a rather striking variation in the carbonate content of the water (table I). In the main stream the methyl orange alkalinity varied from 100 p.p.m. in Moira Lake, a river-lake intimately connected with the river, to 34 p.p.m. in the river 1 mile above Stoco Lake. At the outlet of Big Bay in Stoco Lake itself the alkalinity again rose to 115 p.p.m. only to drop back to 54 p.p.m. at the station just below Flat Rock on the river. The pH at the same localities varied but slightly, ranging from 7.3 to 7.7. The great fluctuation in the methyl orange alkalinity is rather unusual when compared with the more or less uniform condition in alkalinity that often persists throughout the course of other rivers under natural conditions. These data are presented to call attention to the fact that there is reason to believe that in the Moira River there is considerable ecological variation. Such fluctuations may be reflected in the unusual mixture of Atlantic and Mississippi species of mussels inhabiting this drainage.

A list of the twenty-two naiad species and their forms collected at stations in the Moira River is presented in table II. The species have been arranged according to a natural system of classification and are placed into their respective faunal groups. It will be seen that of the twenty-two species, fourteen belong to the Mississippi fauna, while the remaining eight are clearly Atlantic species. The distribution of the groups within the drainage as shown by this table is of interest. Moira Lake contains species which are more or less characteristic of a river-lake environment. The only exception is the presence of *Actinonaias carinata* which is usually not common to a lake environment. The largest number of species (thirteen) is found in the river itself where there is a striking mixture of Atlantic and Mississippi

TABLE I. WATER ANALYSES AT STATIONS IN THE MOIRA RIVER DRAINAGE.*

Station	Methyl orange Alkalinity	Soap Consuming Power	pH
Moira Lake, at railway bridge, Huntington Twp.	100.0	114.0	7.4
Moira River, 1 mile above outlet of Stoco Lake, Hungerford Twp.	34.0	41.0	7.3
Moira River, outlet Big Bay, confluence with creek Hungerford Twp.	115.0	136.0	7.7
Creek, 100 feet from junction with Moira River, outlet Big Bay	166.0	192.0	8.0
Moira River, outlet Big Bay. 100 feet below confluence with creek, Hungerford Twp.	98.0	120.0	7.4
Moira River, Below Flat Rock, 1 mile south of Thomasburg, Hungerford Twp.	54.0	63.0	7.4
White Lake, Huntington Twp.	106.0	120.0	7.5
Black River, 1 mile above junction with Moira River, Elzevir Twp.	20.0	26.0	7.0
Skootamatta River, below Actinolite, Elzevir Twp.	30.0	40.0	7.0

*Kindly made by Mr. J. E. Fasken, Provincial Analyst of the Department of Health.

forms. Although no routine water analyses were made at all stations, it would be of considerable interest if data eventually could be assembled which might show a relation between the relative hardness of the water and the presence or absence of Atlantic and Mississippi species. It is known generally that the pearl mussel, *Margaritana margaritifera,* usually inhabits only soft waters. Other naiades are unquestionably far less specific in their carbonate requirements, but we are almost completely without basic information regarding those which are and those which are not. In a stream such as the Moira River, which obviously occupies the border between two naiad faunal provinces, specific information of this kind could be obtained. Chemical information such as is given in table I, as well as geological information in general, reveal that regions of metamorphic rock alternate throughout this drainage with zones of limestone. A question which might then be asked is: Are the various species restricted according to these fluctuations in alkalinity so that the Atlantic forms inhabit regions of soft water so characteristic of the Atlantic province, while the Mississippi species are restricted to the zones of limestone and harder waters? Another interesting feature shown in table II is that in the Bay of Quinte the naiades are almost exclusively Atlantic species. *Lampsilis siliquoidea* is the only exception to this situation and the normally wide range of *siliquoidea* may account for its ability to inhabit a region occupied almost entirely by Atlantic forms.

Although the ecology of an area unquestionably determines the distribution of mussels within a drainage system, the origin of the naiades in the Moira River was perhaps largely determined by events connected with the glacial history of the region. Bryant Walker (1913-18) had this fundamental concept in mind when he wrote:

> "But on examining the Unionidae of the Great Lakes, we find that, while the fauna of Lake Superior, at the western extremity of the system, is similar to that of the lower St. Lawrence and the New England States, there is in the center of the system, with Lake Erie as its metropolis, an entirely different fauna, which extends eastward as far as the Ottawa River and Montreal, and westward to the Saginaw Valley, and even perhaps as far as Mackinac. The relations of this fauna are entirely with that of the Ohio and Mississippi Valleys."

This idea was later considered in more detail by Ortmann (1924: 113) and by van der Schalie (1938: 10-14). However, thus far no clear conception has been reached as to how the fourteen Mississippi species listed above entered the Moira River. Walker (1913: 45), in considering the invasion of the Great Lakes region by Atlantic naiades, stated that the influx of those species probably took place via either the Trent or the Nipissing outlet. Walker added further:

> " . . . the probability is in favor of the Trent outlet, because that was always entirely fresh water . . . "

In addition to this suggestion concerning the

TABLE II. DISTRIBUTION OF NAIADES IN PORTIONS OF THE MOIRA RIVER SYSTEM

Degree of abundance is indicated by: A—*abundant*; C—*common*; F—*few*; R—*rare*.

	Mississippi Species	Atlantic Species	Moira Lake	Moira River (Stoco Lake to Chisholm Mills)	Bay of Quinte at Belleville
1.		*Elliptio complanatus*	A	A	A
2.	*Elliptio dilatatus*		---	R	---
3.	*Alasmidonta marginata*		---	R	---
4.		*Alasmidonta undulata*	---	R	---
5.	*Lasmigona costata*		---	C	---
6.	*Anodontoides ferussacianus*		---	R	---
7.		*Anodonta cataracta*	---	---	F
8.		*Anodonta implicata*	---	---	R
9.	*Anodonta grandis*		F	---	F
	Anodonta grandis footiana		C	---	---
10.		*Anadonta marginata**	---	---	---
11.	*Actinonaias carinata*		R	---	---
12.	*Leptodea fragilis*			---	R
13.		*Ligumia nasuta*	---	---	F
14.	*Ligumia recta latissima*		---	C	---
15.	*Micromya iris*		---	F	---
16.	*Lampsilis ventricosa*		C	C	---
	Lampsilis ventricosa canadensis		R		---
17.	*Lampsilis ovata ventricosa*		F	F	---
18.	*Lampsilis siliquoidea*		A	A	A
	Lampsilis siliquoidea rosacea		---	R	---
19.		*Lampsilis radiata*	---	F	F
20.		*Lampsilis borealis*	---	R	---
21.	*Lasmigona compressa*†		---	---	---
22.	*Strophitus rugosust*†		---	---	---

*Small lakes of Moira River drainage. †Further up the Moira River

route followed by the Atlantic species that moved west, there is reason to believe that Mississippi naiades may have followed the same course eastward. There is still considerable uncertainty regarding the glacial events that permitted this migration. The possibility of an extension of the Maumee River into and through Lake Ontario in a way similar to that which occurred in Lake Erie during later Algonquin and early Nipissing Lake periods is very unlikely. Dr. Frank Leverett has suggested that the basin of Lake Ontario has a depth which would make such an arrangement in Lake Ontario an impossibility, since that lake basin was actually below sea level. As a consequence, the invasion of the Moira River by Mississippi naiades probably took place by way of the Trent River valley. The course of this invasion will perhaps only be evident when more details are known about the distribution of mussels in Ontario and when more basic data are available concerning the glacial history of the Trent River system.

The Moira River is especially suitable for the solution of several other problems. This area evidently offers excellent facilities for a study of the variation in *Elliptio complanatus*, a species which is among the most plastic of naiades. It varies tremendously in size, shape and color (both epidermal and nacreous). The following measurements given in millimenters were taken from specimens at several stations:

Station	Height	Length	Width	Obesity
Moira River, e. of Chapman's Corners	55.5	98.5	30.5	87.5
Moira River, e. of Thomasburg	54.25	103.5	25.0	76.5
Wolf Lake, Tudor Township	58.5	121.0	26.0	50.5
Buckshot Lake, Lennox and Addington Co.	38.5	69.0	17.0	80.4
Crow Lake, (Trent River drainage)	32.5	63.5	14.5	74.0

Although *complanatus* has a wide habitat range there is little exact information as to whether such variations as those given above can be correlated with the wide diversity of habitat conditions.

Considerable taxonomic confusion exists in dealing with the species of *Lampsilis* in the Moira River drainage. *Lampsilis ventricosa* was found to vary greatly in size and shell weight, and there was some indication that this variation can be correlated with environmental changes within the river system. Also, there is evidence of intergradation in this drainage among specimens of the eastern species, *L. radiata,* and its western counterpart, *L. siliquoidea.* Studies of the biology of these groups in the Moira River should prove fruitful in establishing the proper relationship among these species.

The naiad fauna of the Moira River consists of twenty-two species, fourteen belonging to the Mississippi fauna, while eight are Atlantic species. These faunal groups show distributional zonation. The role of ecology as influenced by the fluctuation of limestone and metamorphic rock in producing habitat differences in relation to zonation is not clear. This region offers excellent facilities for a study of the relationship between distribution and ecological conditions. Considerable variation was noted in *Elliptio complanatus,* while *Lampsilis siliquoidea* and *L. radiata* showed a marked tendency towards intergradation.

I would like to acknowledge with gratitude my indebtedness to Dr. Henry van der Schalie of the University Museum, University of Michigan, and Mr. John Oughton of the Royal Ontario Museum of Zoology, for their assistance both in identifying specimens and in preparing this manuscript.

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CHIEF FACTOR JAMES ANDERSON'S BACK RIVER JOURNAL OF 1855

(Concluded from page 26)

August, 1885—LAKE AYLMER—Up—71

Frid. 31st. Made 2 short portages and passed 2 ponds of water and then a 3rd portage brought us to L. Aylmer at 6 a.m. The canoes were thoroughly gummed and we embarked at 7. We had to contend with a strong head wind all day, which retarded our progress much. The weather was bad also, foggy in the morning and rain afterwards. Several deer were seen today (perhaps 30) and 2 were shot by Mustegon and J. Fidler—a 2 year old buck and a doe. A slight deviation was made by entering a bay running to the S.E. which is not noticed in Back's map; we lost by this about 1½ hours. Encamped at dusk near the narrows leading to Clinton Golden [195] Lake. We have now lost the willows and are reduced to burn heath.

Sat. Sept. 1st. A beautiful day, most of which was wasted in finding our road and I am not quite sure if we are, as I suppose, encamped at the straits leading to Clinton Golden Lake. Back's map makes it appear that the Strait was bounded by the Sou'n shore, whereas a deep bay running E. and S.E. intervenes between the Straits and the South Shore. The map is utterly useless for such a lake as this. Some very small spruce[196] were seen at the bottom of the Bay before mentioned, out of which we got by a portage[197] to the proper Bay. Several deer were seen and 2 shot by E. Kippling and J. Fidler, the former (*September,* 1855—L. AYLMER—*Up*—72) a large fat buck, the latter one of 2 years.

195. Clinton Colden; also below.

196. Probably white spruce, *Picea glauca,* although in the Kazan basin and perhaps elsewhere in the Keewatin District black spruce, *Picea mariana,* extends farther north than does the white spruce. (A.E.P.)

197. Apparently they became lost in Aylmer lake and got in behind the big peninsula on the south shore; the portage would then be over the isthmus about twelve miles west of Thanakoie Narrows. See Lockhart River Basin map, Department of Interior 1928. (M.G.C.)

Sund. 2nd. Blowing a gale from the N. and N.E. We were compelled to pull down the tent during the night to prevent it being carried away. The wind abated about 3 p.m.; but we did not leave as I had sent off Mustegon to see if this was the right strait. He returned late with the information that it was. Immense flocks of Canada geese passing all last night and today. The men arranged their little affairs and dried the contents of their bags. Mustegon killed another buck. Froze sharply.

Mond. 3rd. Reached Clinton Golden Lake at breakfast (7 a.m.) Snow in the morning. Froze sharply. The wind was blowing a gale from the E.S.E. which rendered it impossible to take the Traverse to the first Point.

Tuesd. 4th. Detained by the gale till 6 p.m. It then subsided a little and we took the Traverse; shipped much water and our ricketty canoes were sadly strained. Encamped at 11 p.m. at the 1st large island.[198] Ignace killed a buck.

September, 1855—CLINTON GOLDEN LAKE —73

Wed. 5th. Started at 2½ a.m., having just laid down on the beach till we could see. Fog till after breakfast. The whole day has been spent in looking for the river. Back's small map is a snare and delusion. We are encamped for what we suppose (for the 3rd time) to be the straits.[199] Many deer seen and some snow geese.

Thurs. 6th. Detained by dense fog till 9 a.m. We then left tho' the fog was still thick. This compelled us to round several extensive bays. We at length fell on a strait with some current in it encamped at dusk near the Rapids leading to Artillery Lake. I trust never to be guided by such a map[200] as I have again. Many deer seen, bucks—three very fat ones were killed, 2 by J. Fiddler and 1 by Ignace. Traces of Indians seen.

Frid. 7th. Ran the 2 first Rapids but lowered down part of the 3rd., the water being so low that there was a small fall. Saw very small pines[201] above the 2nd Rapid, and afterwards they increased in size till about halfway in Artillery Lake they became a *respectable* size. A good many deer seen about the Rapids, but not many in this lake; the majority of (*September*, 1855—ARTILLERY LAKE—*Up*—74) those seen today, does with young. We had strong head wind till about 2 p.m., after which we carried sail with the paddle for about 1½ hours and it then fell calm. Last night A. B.[202] mod. every where in irregular patches. We encamped at dark opposite what I suppose to be the Island called the Rat Lodge. Left a notice for the boats in case we missed them at the Narrows below the Rapids. We took the West shore at the 3 first Islands marked in the map (4). There is a pretty deep Bay running to the W. and S.W., not noticed in the map.[203]

Sat. 8th. Blew a N.Wt. gale last night with rain; the waves were beating so high against the shore that we made a portage to a small bay, and after shipping much water and working our crazy canoes much, we succeeded in crossing to the Beaver Lodge;[204] the wind increased with rain and snow, till at last we were compelled to encamp at 7 a.m. at a bay[205] on the Wt. shore, where we afterwards discovered Capt. Back built his boats. We were detained here all day.

(Larch found in this bay).[206]

September, 1855—ARTILLERY LAKE—UP —75

Sund. 9th. The ground was white with snow this morning and still blowing a heavy N. Wtr. with drizzling rain and snow. Took an early breakfast and left at 5 a.m. under double-reefed sails. Kept along the E. shore until we fell in with some Indian Lodges, and the rest of the day was spent in trying to find out their road to Fond du Lac du Ercleams.[207] we made a move in the evening to the bottom of a deep narrow bay on the Et. shore where were 10 Indian canoes, several lodges or at least the poles of lodges and remains of deer. The Indians have left this about a fortnight since. We are not yet quite sure of our road. It is really too bad that Indians have

198. The Big Island in Clinton Colden lake. See Lockhart River Basin map. (M.G.C.)

199. Probably Caribou narrows at southeast end of Clinton Colden lake. See Lockhart River Basin map. (M.G.C.)

200. The fog must have deceived Anderson; in reality Back's map is excellent for that portion of the route actually seen by him. (M.G.C.)

201. These are in reality small spruce which were still to be seen in 1924 (M.G.C.); probably *Picea glauca*, pine and spruce were formerly used synonymously. (A.E.P.)

202. Aurora Borealis.

203. About twelve miles from the north end of Artillery lake. See Lockhart River Basin map. (M.G.C.)

204. It appears that he has confused the Beaver Lodge and Rat Lodge; the former is on the east side and the latter on the west side. Once before in his journal, Monday, June 25th, he refers to Rat Lodge on the east of Artillery Lake. (M.G.C.)

205. Timber bay—see Lockhart River Basin map. (M.G.C.)

206. *Larix laricina* (A.E.P.)

207 Should be "Fond du Lac des Esclaves;" this is surely a mistake in transcription.

not been sent to meet us. Numerous flocks of geese and wavies passing. 4 kinds of berries ripe.[208]

Mond. 10th. Ground white with snow this morning. Many geese passing. Very early this morning Mushtegon and J. Fidler went to find the straightest road to the height of land, returned and after breakfast (8 a.m.) we began[209] the portages and before night had passed 8 lakes and made 8 portages—5 miles, all in a S.Wn. direction. The lake we are on is rather larger and the rivers connecting the lakes are more considerable—the last one was navigable. Men much fatigued. (Wood increased in size and quantity as we approached Slave Lake. Birch [210] fit for axe handles to be found. Very few deer tracks).

September, 1885—FROM ARTILLERY LAKE to S. LAKE—UP—76

Tuesday 11th. Left early. Fell on an Indian track. On entering the river made 2 portages equal to ½ mile and shortly after got sight of Slave Lake. The river was here larger but shallow and interrupted by several falls and cascades. The pieces were carried straight to the mouth of the river (5 miles) and the canoes were brought down (light) the river partly by water and several bad portages. They did not succeed in reaching the pieces. Mr. Stewart and I crossed the river by wading at a rapid and found the fort; it is built on the old site of Fort Reliance, but on a smaller scale. We slept here. Mr. Lochart left yesterday with the 2 boats; he is not far off as there is a long portage to make and I sent off immediately to tell him to return. A whiskey Jack[211] was seen where we breakfasted, the first for many weeks.

Wed. 12th. The canoes arrived at 10 a.m. After arranging matters I left at 2 p.m. with my canoe, Mr. Stewart remaining to meet Mr. Lochart. Carried sail to the Point, but afterwards had the wind strong nearly ahead. Encamped late a little beyond Hoar Frost River,[212] A. B. faint.

Thur. 13th. Left early. Met an Indian about 7 a.m., who gave us some fat meat, we afterwards saw some women and children. Arrived at the Mountain Portage about 3 p.m.; put ashore in (*September,* 1855—*Gt. Slave Lake*—77) the bay beyond it to await the arrival of the two canoes from Simpson, which were seen under sail. Took one of these canoes and sent off the other with the 2 crews at 4 p.m. to meet Messrs. Stewart and Lochart. Gummed and arranged the canoe and proceeded about 6 miles beyond the Mountain Portage at a little river.[213] Wind strong ahead since mid-day and shipped much water—these 2 canoes are the proper length, but too narrow and low, the gunnels also are too weak by far.

Friday, 14th. Left early. Met some Indians going to Resolution about 7 a.m. Encamped about sunset at the beginning of the Cut Rock leading to Pipe Stone Point[214] (opposite the mouth of the large bay). Weather rather cloudy with some light showers; nearly dead calm and consequently a splendid day for paddling. A great many wavies passing tonight. Aurora Borealis superb in streamers and rays of all colours, very active about 11 p.m.; rays apparently descended to within 100 feet of the water.

September, 1855—Great Slave Lake—Up—78

Sat. 15th. Left early. Wind rather strong ahead. Encamped at dusk among the islands where we dined on the 27th June. A. B. very active, same as yesterday. Saw a few small poplars[215] before encamping.

Sund. 16th. Left at 2½ a.m. Nearly calm. Men paddled very hard; smoked once and arrived at the last Cariboo Island at 9 a.m. Wind a little stronger ahead; took the Traverse straight to Stony Island 3¾ hours (Mushtegon never once missed his way through the labyrinth of islands). Supped at 6 and arrived at Resolution at 9 p.m.. men quite fresh.

17th. Resolution.
18th. Res'n"
19th. Res'n.

208. These are probably "baked-apple," (*Rubus Chamaemorus*), crowberry (*Empetrum nigrum*), bilberry (*Vaccinium uliginosum*), and mountain cranberry or cowberry (*V. Vitis-idea*). (A.E.P.)

209. He is following Pike's portage southwesterly from Artillery lake to Acres lake. Here they left the route of Pike's portage, travelling west and north down the small river emptying into Charlton bay, about one mile east of old Fort Reliance. See Fort Reliance four mile sheet by Department of Mines and Resources 1938. (M.G.C.)

210. This would be the paper birch, *Betula papyrifera.* (A.E.P.)

211. Canada Jay, *Perisoreus canadensis.* (P. A.T.)

212. See Fort Reliance sheet, four mile, Department of Mines and Resources 1938. (M.G.C.)

213. Misnamed Barnston river on Fort Reliance sheet. (M.G.C.)

214. Utsingi Point, shown on Eastern sheet Great Slave Lake, is Pipestone Point; the cut rocks run from Talthelei narrows to Utsingi Point east with few interruptions. (M.G.C.)

215. *Populus tacamahacca.* (A.E.P.)

20th. Res'n.

21st. Res'n. Stewart and Lochart with one canoe arrived at 1 p.m.

22nd. Equipped men. Remainder Expedition men arrived.

September, 1855—RESOLUTION—79

23rd. Stewart and Lochart and the two other boats arrived.

Mond. 24th. Sent off 2 boats to Simpson. I would now start but have to pay off some Indians, pack up the remainder of the Exp. goods, and if possible await the arrival of despatches per "A" boat which should now be here.

Tuesd. 25th.

Wed. 26th.

Th. 27th.

Fr. 28th. Left Resolution at 10 a.m., the "A" boat having arrived yesterday afternoon. Boat very deep. Wind moderate till we came to the last islands to go to I. Aux Morts, when we were compelled to encamp. Drizzling rain.

Sat. 29th. Wind N.E. with a very heavy swell which compelled us to put on shore at 1 p.m. at the Sulphur Springs where we were wind, or rather swell—bound all day. Showers of rain and snow at intervals all day. A. B. faint in the evening. Sharp frost.

September, 1855—RESOLUTION—80—81

Sund. 30th. Left at the first appearance of dawn. Carried sail with a very light breeze and pulled. Supped at Pt. des Roches and reached Big Island about 2 a.m. of

Mond. 31st. Arranging different affairs for Fort Rae etc. Left B. I. at 1 p.m. Soon after hoisted sail to a light breeze and at the same time pulled. Water extremely high both in the Lake and River. Supped at 7 p.m. a little below Pt. de St. Restaux;[216] then hoisted sail to a light air of wind; day broke when we had entered the small lake. Met Borogh about 5 p.m., above P. St. Restaux.

Tuesd. 1st October. Wind veered ahead after daybreak; put ashore at the foot of the little lake to breakfast, when it began to blow a gale which compelled us to run into a little river[217] on the left bank where we were nailed till the next morning.

McKenzie River

Wed. 2nd. Encamped at Spence's River.

Thursd. 3rd. Reached Fort Simpson about 9 p.m. (82)

JAMES ANDERSON TO JAMES GREEN STEWART.

Fort Simpson,
30th March, 1855.

Mr. James Green Stewart,
Fort Resolution.

My Dear Sir,

The Southern Express arrived here yesterday at mid-day. By it I received Sir George Simpson's instructions regarding the expedition we have the honor of being appointed to conduct.

2d. Sir George Simpson appears to be apprehensive that I may arrive too late at Fort Resolution to take the command, being probably unaware that the southern portion of the Lake breaks up eight or ten days earlier than the northern portion. Were there the least risk of such an event, I should, of course, now take my departure, but as there is not, I shall remain here till the McKenzie breaks up, and ascend the river with 2 canoes or a boat, in which I shall embark the supplies for the men, articles of Esquimaux trade, ammunition etc. By adopting this plan I shall save much time, trouble and expense, and moreover have an opportunity of seeing C. F. Campbell with whom I have much to arrange.

3d. You have of course already commenced the construction of the canoes. I trust that the Chipewyan model has not been followed, as their canoes can stand no swell. It (83) will be requisite to procure a large supply of gum and wattap,[218] with bark for repairs. The gum should be well cleaned, cooked and blazed; the Iroquois will know how to do this. Some extra paddles should also be made, as we shall be in a country where wood is a rarity; the requisite Agrêts will be brought up from here.

4. On the arrival of the Fond du Lac[219] Hunters, six at least should be engaged for the purpose of hunting for the Expedition; the most skilful should of course be chosen, and if their conduct be good, they shall be most liberally remunerated. You will also hire King Beaulieu at the rate of £40 per annum while employed in the service, as interpreter and hunter, and to look after the party of Indian hunters, who I intend shall meet us on our way back. I con-

216. Pointe Saresto—see Petitot's map "Mackenzie River Basin 1867-73," on north side of Mackenzie river about twenty-five miles below Big Island Post. (M.G.C.)

217. Probably Bouvier river—see Map Sheet No. 12, Mackenzie River Series, Department of the Interior, 1923. (M.G.C.)

218. More often called "watapy;" rootlets of spruce and tamarack used for sewing birch bark.

219. Fond du Lac of Great Slave Lake is meant, not post by that name on Lake Athabaska.

sider this man as indispensable *and he must not refuse.*

5. Two men must be sent immediately on the receipt of this to Chipewyan, who will return in canoe as soon as Slave River breaks up, with the following supplies belonging to Government, viz.—1 keg gunpowder, 1 bag ball, 1 Bag shot, and also the tobacco if any be left. If Mr. Bell can exchange the bag of shot for a bag of ball it would be more serviceable for us. I need hardly add that this Am'n must not be touched on any account, except it may be to furnish a small supply to any Indians who promise to hunt for us.

6. I send up a little tea for the men, and you (84-85) may tell them that they shall be equipped properly with the requisite clothing etc.

7. In addition to the above supplies belonging to Gov't you will also request 60 pairs moccasins from Chip'n, half of them topped and large enough to hold a sock.

8. On the last ice ten men including two of the Iroquois are to be sent to Big Island to meet me and this will be the means of saving some provisions.

9. In all your arrangements you will consult with Mr. Ross who can of course afford you much valuable information, and who, in the event of your absence, has permission to open this letter and act on its contents.

10. I can only spare 1 keg of G. Powder from here with lead, so that it is absolutely necessary for the success of the Expedition that the ammunition at Chipewyan be brought down. I believe there is nothing else requiring immediate notice, and with best wishes,

Believe me to be truly yours

James Anderson (a) C.F.
Commanding L. A. F. Ex.
(86)

JAMES ANDERSON TO SIR GEORGE SIMPSON

Fort Resolution
22 June, 1855

Sir George Simpson,
LaChine, C.E.

Dear Sir,

I beg to state for your information that the Expedition is now ready to take its departure either this evening or tomorrow morning. This bay, which is under the influence of Slave and Buffalo Rivers is quite free from ice, but the body of the lake is still fast. The weather latterly has been very warm, and a strong gale last night and today will I hope break open a passage for us.

I intend to adopt a different route from that followed by Sir G. Back. We shall leave Slave Lake about the "Mountain" and follow a chain of lakes with 7 portages to Artillery Lake. The advantages to be gained by following this route are, that it opens earlier than the Fond du Lac route and we avoid the ascent of Hoar Frost River, which at this season must be all but impracticable (See note at end).

I regret to say that the Esquimaux interpreters have not made their appearance; this is most distressing as I shall not be able to accomplish my instructions satisfactorily. It will (87) be impossible for a party to winter on the coast, as the means at my command will not permit me to take down any supplies for such a purpose, the canoes being hardly able to convey the provisions and supplies required for the summer trip.

I have directed two boats to be built and to be brought to the head of Fish River[220] next Fall, besides making other arrangements for another season, in case they may be required.

I have to acknowledge myself under great obligations to Messrs Stewart, Ross and Lochart for the zeal and activity they have displayed in forwarding the objects of the expedition. The men seem to be in excellent spirits, and were the Esquimaux interpreters here, I should have strong hopes of accomplishing our task satisfactorily.

I have the honor to be, Dear Sir,

Your Obed't Serv't
James Anderson (A) C.F.
Com'g L.A.S. Exp.

Note.[221] The above was the information I received from Mr. Stewart. I had not then had time to examine the guide hired by him, according to my orders, but being wind-bound at Pt. des Roches (88-89) I examined the man and found he had never been further than Clinton Colden Lake and that the only route he was acquainted with was one which struck off on the E. side of the Bay on which Fort Reliance is placed, and by means of 7 or 8 portages and small lakes he would fall on Artillery Lake at the Rat Lodge. At Fort Simpson I had questioned a rather stupid Dog Rib Indian (Timbré) regarding the practicability of the Mountain Route which was evidently shorter and by which

220. It is impossible to tell whether Back River (Great Fish River) or Thelon River (sometimes known as Fish River) is meant here.
221. This discussion was obviously written after the return of the expedition.

Artillery and Clinton Colden Lake as well as the Fond du Lac of Great Slave Lake would be avoided, he told me it was dreadfully bad and gave (what I afterwards found) to be a pretty correct chart of the route. As I found the guide hired by Mr. Stewart to be worthless, I enquired if either of the 3 Yellow Knife Indians I had added to the crews were acquainted with this route, and found that two of them were. On examining them I found their statements to agree with those of Timbré's and I then and there determined to follow this route, which alone caused the success of the Expedition that season. Had we followed the other route we should never have reached the sea. The canoes would have been worn out before reaching the head of the river, and most of our provisions would have been expended.

J. A.

(90)

JAMES ANDERSON TO JOHN SWANSTON

Fort Resolution, 22nd Sept. 1855

John Swanston Esq.,

Dear Sir,

Messrs Stewart and Lochart with the Expedition we leave here tomorrow.

As it will save much trouble and expense if the party can reach Isle a la.[222] by open water. I have as an encouragement to the men, changed the terms of their engagements to the trip instead of the year. Thus one of those engaged at £50 *per annum* will get £50 for the trip, should we arrive at Red River or Norway House before the year elapses. Alfred Laferte is however to be excepted from this. I have a strong suspicion that he simulated sickness; he will only therefore get his bare wages.

The three Iroquois should start immediately for Montreal, and I request that the despatches be entrusted to Ignace Montour; he is a sober man and knows the road perfectly. The despatches should be so packed that he may have them constantly about his person.

Of course any supplies ordered for this Expedition are no longer required.

I shall have the pleasure of addressing you by the winter Express, and have the honor to be etc., etc

James Anderson (A) C.F.
Com. L.A.S. Ex.

(91)

JAMES ANDERSON TO THE GOV'R & COUNCIL OF THE NR'N DEPT.

Fort Simpson
26th March, 1856

To the Gov. & Council
of the Nor'n Depart't,

Gentlemen,

I beg to call your attention to the misconduct of Chief Trader Jas. Green Stewart when conveying the despatches of the Land Arctic Sear'g Expedition last Autumn, whereby the service has been exposed to the ridicule and contempt of the public and to the censure of H. M. Govt.

Messrs Stewart and Lochart left Fort Resolution on the 23rd Sept. in two light canoes manned by 17 men. The Autumn was so fine, that they reached the Grand Rapid, L. Winnipeg, without any material difficulty. Mr. Stewart instead of sending on the despatches direct to Red River from that place under the care of Mr. Lochart, in one of the canoes manned by the 3 Iroquois and 5 other men, proceeded to Norway House where his wife was with both canoes. They arrived there on the 26th Oct. and proceeded thence in a boat to Red River, which they reached on the 3d Novr. Here the Express was again retarded till the 12th when Mr. Stewart left on horseback taking his wife with him. As snow fell shortly after his departure it was supposed that the Express would have met with much detention.

Mr. Stewart ((92) had previously requested me to sanction his going out with his wife. I told him that I was not authorized to do so, and that even if I were, I should never sanction such a preposterous arrangement. My directions to C. F. Swanston were to forward it by the 3 Iroquois, giving it in charge to Ignace Martour[223] who is a trustworthy man and well acquainted with the route. Had the despatches been brought direct from the Grand Rapid and forwarded by the Iroquois, I have no doubt that they would have reached England by the end of Novr. or beginning of Dec'r. This is certainly the first time that I ever heard of despatches of great public interest being retarded for the private ends of any one, or of an express being saddled with such an encumbrance as a lady.

As it would save much expense and trouble if the expedition could reach Red River before the closing of the navigation, as an encouragement to the men to exert themselves to the utmost, I promised that they should get their wages for the whole year, even if they should

222. Isle a la Crosse.

223. Montour.

arrive at R. R. two months before it elapsed. I however made one exception viz. Alfred Laferte; this man was a decided malingerer, had endeavored to create disaffection amongst the men, and had otherwise behaved most disgracefully. I directed Mr. Swanston to give this man only his bare wages; in direct contravention to (93—94) this order Mr. Stewart gave this man the same terms as the others, because he said that he had guided the party down English River. I have no hesitation that this is a false pretence, as one of Mr. Stewart's steersmen, viz. Thos Mustegon, was a much better guide than Laferté. I did not solicit the command of this expedition, but as I was appointed to it, I am determined to uphold my authority, and have therefore directed Mr. Swanston to charge the whole of Mr. & Mrs. Stewart's expenses for their trip as well as the extra wages paid to Laferté to Mr. Stewart's private account, until their expenses be sanctioned by Sir G. Simpson or H. M. Govt.

Had Mr. Stewart conveyed the despatches rapidly to Red River and conducted himself otherwise with propriety it was my intention to have passed over his conduct during our voyage to the Arctic Sea without any public notice. I now, however, beg to state that during the entire trip he was perfectly useless to me, and nothing more than a mere encumbrance, as may well be ascertained by examining any of the men belonging to the Expedition.

Having now plainly brought Mr. Stewart's conduct before you, I shall leave you to deal with him as you think fit.[224]

And have the honor to be, Gentlemen,
Your obedient servant,
James Anderson (A) C.F.
Late Comm. L.A.S.Ex.
(95)

JAMES ANDERSON TO J. G. STEWART.

Fort Simpson, 24th March, 1856

J. G. Stewart, Esq.,
Dear Sir,

Your short notes from Athabasca and Red River reached me yesterday. They afforded me little satisfaction and I learnt your proceedings from other quarters.

I regret to say that I totally disapprove of your proceedings after you reached the Grand Rapid; it was very natural for you to proceed to Norway House to join your wife, but you were not justified in retarding our important despatches for your private ends. You could have taken one canoe, and sent on Mr. Lochart and the despatches with the 3 Iroquois and 5 other men direct to Red River; they would probably have reached there on the 29th October and the despatches could have been sent off as I directed in the care of Ignace, on the 31st, and would probably have reached St. Pauls without being troubled by snow. It is the first time that I have heard of an Express being saddled with such an encumbrance as a lady, or retarded on account of the private affairs of any one.

You tell me that in direct opposition to my orders you have given A. Laferté the same wages as the other men, because he guided you down English River; now you had a far (96) better guide in your canoe, namely Thos. Mustegon. I did not solicit the command of this expedition, but as I was appointed to it, I am determined that my authority shall be respected. I have directed Mr. Swanston to charge your own and Mrs. Stewart's expenses as well as the extra wages you paid to Laferté on your own authority to your private account. As for the retardment of the Express you will have to answer for that to the higher powers. I beg to inform you that I have called the attention of the Council to the subject.

I found your gun very shortly after you left and sent off Candrie with it via Buffalo River, in hopes that he would have reached the river before you arrived. I suppose that it has been forwarded.

A frock coat of yours brought from the Youcon has been sold and the proceeds £2, placed to your a/c.

In haste.

I am your obed'y
James Anderson (A)

224. References to Stewart in books and records of later date would indicate that this censure could not have interfered with his advancement.

ADDENDA & CORRIGENDA

1. All footnotes without initials are by C. H. D. C.
2. p. 64, Vol. LIV, footnote 6; the year of publication, 1937, should be added.
3. p. 67, Vol. LIV, 2nd column, 3rd paragraph; after "Friday" read 15th instead of 16th.
4. p. 87, Vol. LIV; footnote 90 should commence *"Picea glauca* or *Picea mariana."*
5. p. 107, Vol. LIV; footnote 95 should read *"Cetrania nivalis."*

BOOK REVIEWS

EAST IS EAST AND WEST IS WEST. *By Carlos E. Cummings. Bulletin of the Buffalo Society of Natural Sciences. Vol.* 20, 1940.

I may be going a little far, but I am firm in the opinion that this is one of the most important books on museum exhibits that has ever been published. But what, you may ask, has a review of a book about museum work to do with natural history? Well, in the first place, it was published by a famous Society of Natural Sciences; futhermore, most naturalists realize today that museums are for them what libraries are for workers in other fields, and that museums, which look after the preservation of scientific specimens, are an essential part of natural history work. I wish that I had written this book, so closely does it agree with what I have long said or felt, and tried to get others to see and feel. Take, for instance, the matter of museum labels, one of the 'difficult' bits in museum work. "We must emphasize again," says Dr. Cummings, "our general statement to the effect that, no matter where displayed, the average visitor considers the reading of labels a bore." And then he goes on to quote the statement of two other investigators who "affirm positively that, with the exception of 'exit' and 'toilet,' signs and labels are quite useless as far as the general public are concerned." Such questions as the mental age of the average visitor, what the public gets from the exhibits, the provision of seats, lighting, colour, sound, demonstrations, guides, and a thousand (literally a thousand for all I know) other topics are discussed, with the requirements of the visitor, rather than those of the curator, in mind. It's been said before, and it should be said again, that it is only the exceptional specialist who should be entrusted with the arrangement of an exhibit of his speciality. If you get a palaeontologist to arrange an exhibit of fossils, he'll get the thing so plastered with polysyllabic trinomials and other complications that the layman can't figure out what the deuce it's all about anyway. This is a book which every museum director should read and then read again. As for the rest of the staff, they'll read it without urging and those of them who know their work will be as enthusiastic as I am; the others will never be museum men anyway.—D.L.

CHARMANTS VOISINS—*by Claude Mélançon, pp.* 281, 66 *drawings in black and white by Jacques Bédard; Librairie Granger Frères Limitée, Montréal,* 1940. $1.00.

Claude Mélançon is already well known to French-Canadians, and also to alert and well-posted English-Canadian naturalists, as the author of *Nos Animaux Chez Eux* and *Les Poissons de nos Eaux,* systematic accounts of mammals and fishes, written with the interests and needs of the general public in view. Both have a great deal to commend them to English readers, and in fact there are no English books filling quite the same niche.

In *Charmants Voisins* Mélançon turns his attention to birds, and the result is a distinguished contribution to Canadian bird literature. The systematic approach has been abandoned, and instead we have essays on some seventy species of birds, selected because they can be seen without searching, and make their homes in surroundings frequented by men. These essays are interesting and, above all, accurate, the author having consulted freely the great standard works of American ornithology. There are one or two typographical errors, and, on page 147, "Pee wee" is given as an alternative English name for the Phoebe, but there are no flaws of sufficient importance to mar the book. The average reader will find something familiar on many pages, and something new on every page. It is thus that interest is stimulated. One examines eagerly chapters on the Crow, and on birds of prey; they are full of facts and free of prejudice.

English-speaking ornithologists will find *Charmants Voisins* a useful source book for both popular and formal French names for birds, and a number of Quebec sayings and beliefs about birds. Any naturalist interested in the French language will find in it a book by one of French Canada's ablest writers, with subject matter that will sustain his interest, and a flavour that is completely Canadian.

The illustrations, by Jacques Bédard, are a splendid supplement to the text. The deficiencies of a few may well be blamed on the limitations of the medium, and the merits of a number are outstanding.—C. H. D. C

NOTES AND OBSERVATIONS

MYOTIS SUBULATUS LEIBII AND OTHER BATS HIBERNATING IN ONTARIO AND QUEBEC—The least brown bat, (*Myotis subulatus leibii*) has been reported but once in Canada, a summer specimen, from Middlesex County, Ontario, by Davis (1931). However, on January 17, 1941, two of this species were found hibernating in a cave in Tyendinaga Township, Hastings County, Ontario, and on the following day four more were discovered in a cave near St. Pierre de Wakefield, Gatineau County, Quebec. Each of these caves also contained hibernating pipistrelles (*Pipistrellus subflavus obscurus*), a bat heretofore unreported in Quebec, and of which only two winter specimens had been taken in Ontario by Hitchcock and Reynolds (1940), in Wellington County. Specimens of each of these species have been presented to the National Museum of Canada, Ottawa, and the Royal Ontario Museum of Zoology, Toronto.

In addition to the two species noted above, *Myotis keenii septentrionalis* was found at the Wakefield cave, and *Myotis l. lucifugus* and *Eptesicus f. fuscus* at both caves.

REFERENCES

E. DAVIS, First Canadian record for the least brown bat. *Canadian Field-Naturalist,* vol. 45, pp. 118-119, 1931.

H. B. HITCHCOCK and K. REYNOLDS, Pipistrellus hibernating in Ontario. *Canadian Field-Naturalist,* vol. 54, p. 89, 1940.

—HAROLD B. HITCHCOCK.

BANDED STARLING RECORD FOR TYVAN, SASKATCHEWAN.— Shortly prior to May 15, 1939, one of my students found a European Starling (*Sturnus vulgaris*) caught in a gopher trap which had been placed on a fence post to catch crows. This bird was wearing United States Biological Survey band No. 38-249936, which was placed on it at Des Lacs Waterfowl Refuge, Kenmare, North Dakota, on August 28, 1938, by Mr. Seth H. Low. It is believed that this is the first record of a banded Starling being recovered in Saskatchewan.

No doubt as bird banders continue to mark these birds in large numbers, much new and interesting information will be obtained as to the spread of this introduced species in North America.

Tyvan is situated in the prairie region of Saskatchewan, fifty miles southeast of Regina.

If anyone desires any further information, I shall be glad to furnish it if possible.—JOHN H. LAZELLE.

THE OLIVE-SIDED FLYCATCHER NESTING IN THE TORONTO REGION.—The summer occurrence of the Olive-sided Flycatcher (*Nuttallornis mesoleucus*) in Ontario south of Muskoka District has been recorded on but few occasions. The Rev. C. J. Young reported finding a nest with two eggs at Sharbot Lake, Frontenac County, on June 6, 1904, and a second nest with three eggs on June 23, 1904, fifty yards from the first nest.[1] It has been reported as a frequent summer resident in coniferous timber in southern Victoria County by E. W. Calvert.[2] L. L. Snyder recorded its presence in the summer of 1926 in the Holland River swamp, King Township, noting one individual on July 18 and two on July 23, and suggested "that the species may be other than a migrant" in this area.[3]

On June 15, 1940, this prediction came true when R. D. Ussher, D. Sutherland and the writer found a pair of these birds frequenting a swampy section on the north side of the Holland River marsh, in Simcoe County. Our attention was first attracted by the 'sentinel' position of one of the birds atop a tall, dead spruce. As we came nearer, both adults flew around excitedly, occasionally alighting on the tops of dead trees and giving voice to their feelings with oft repeated calls resembling the words 'quip-quip.' The actions of the birds invited further investigation which subsequently resulted in the writer finding the nest. It was barely discernible from the ground and was detected when one of the birds was seen to settle down on a branch in an attitude that indicated possible incubation.

The nest was a rather shallow structure of fine twigs and rootlets fastened among the mass of small outer twigs on a horizontal branch of a tall black spruce, thirty-five feet above the ground. When examined, its contents consisted of two eggs. On returning one week later, the completed set of three slightly incubated eggs was found. The nest and eggs, apparently the first to be located within the twenty-five mile boundary of the Toronto region, are now in the collection of the Royal Ontario Museum of Zoology.

REFERENCES

1. YOUNG, REV. C. J., 1904. *Ottawa Nat.,* 18: 139-40.
2. CALVERT, E. W., 1925. *Can. Field-Nat..,* 39:51.
3. SNYDER, L. L., 1930 *Trans. Royal Can. Inst.,* 17: 191.

—O. E. DEVITT.

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NOTES ON BIRD-LIFE OF CHURCHILL, MANITOBA

By LAWRENCE I. GRINNELL and RALPH S. PALMER

FROM June 2 to July 23, 1940, the writers had occasion to visit Churchill, Manitoba, for the purpose of studying and photographing birds there.

On our arrival many species of birds were already present in abundance and were in full song. The Churchill River was still frozen solid, but the ice went out the fourth day of June. Temperatures recorded at the Radio Station in Churchill reached freezing point or colder during seven of the nights between June 2 and 15 and, for the same period, ranged from a minimum of 27° Fahr. to a maximum of 64°. The weather for the first half of June averaged fairer than for the latter half, when heavy clouds and rain occurred almost continually for twelve out of fifteen days, the temperature ranging from 31° to 64°. During our stay for the first twenty-two days of July, fair weather prevailed mostly for all except three days with temperatures ranging from a minimum of 43° to a maximum of 77°.

The area observed consisted of the peninsula at Fort Prince of Wales, on the east side of the mouth of Churchill River to about six miles southeasterly toward the Gravel Pit and bounded by Hudson Bay and Churchill River. Observation also included a day's trip made to the peninsula on the west side of the river, ending in Fort Churchill. Owing to our having to devote part time to life history studies, the territory covered was chiefly confined to a radius of one mile of the two cabins where we stayed, two miles southeast of the town on the narrow-gauge railway.

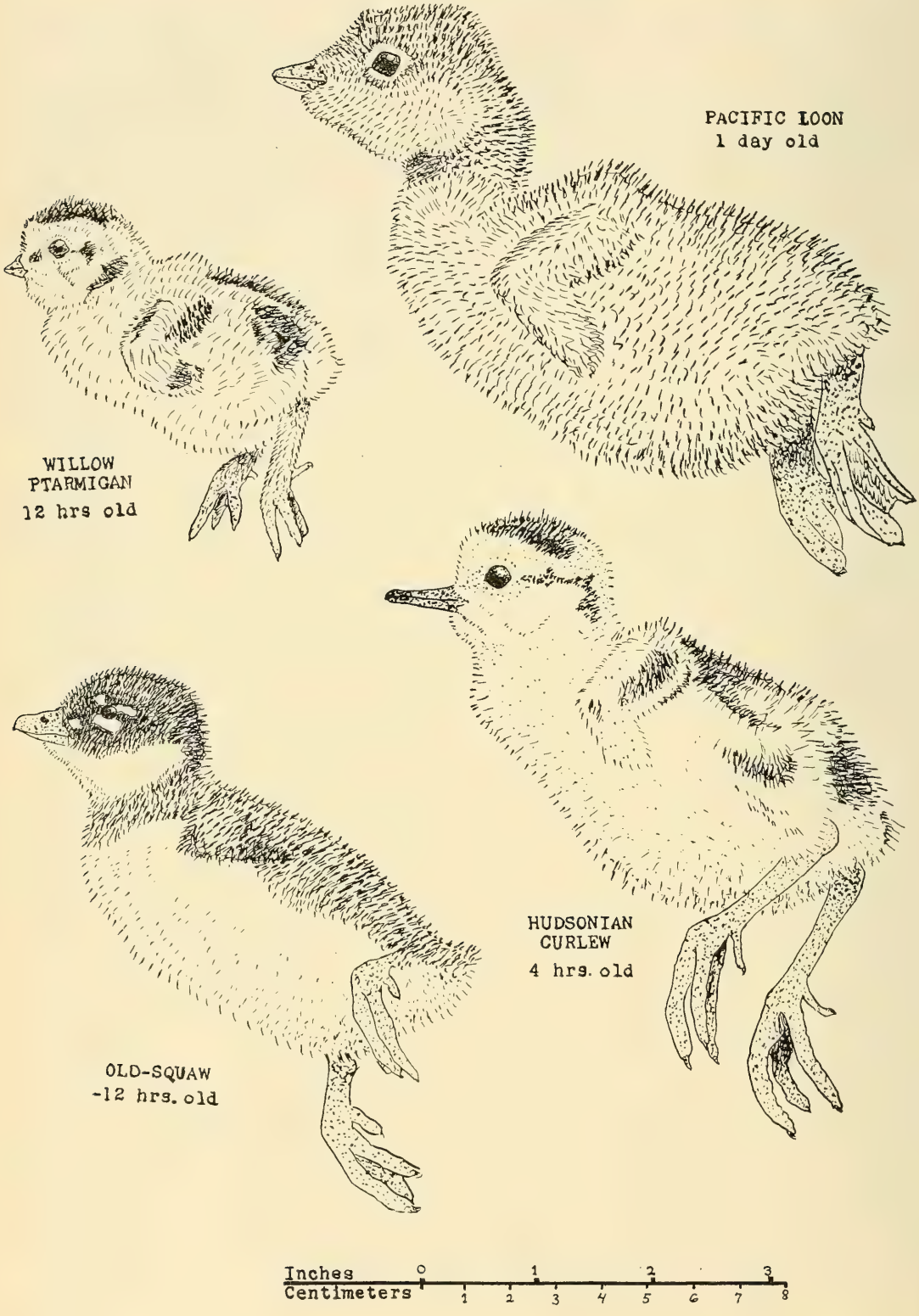
So far as we are aware, there are included in our annotated list all the birds recorded from the Churchill area since the extensive and excellent account of the birds of the region by Taverner and Sutton appeared in 1934. A number of species have been added to the recorded list by F. L. Farley and F. M. Baumgartner since that paper appeared. Dr. A. A. Allen visited Churchill in 1934. Through his courtesy we are able to add a few notes of his, including records of two birds hitherto unrecorded from that area. Added to these are a few species first seen by us. We are including these various records in order to make this report supplementary to the Taverner and Sutton paper. The names of the fifteen species or subspecies included here, but not reported from Churchill by Taverner and Sutton, are preceded by an asterisk in the annotated list.

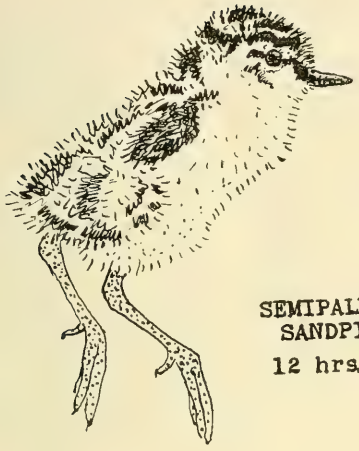
Pen sketches of the downy young of ten species of birds, redrawn from water color portraits made at Churchill by the junior author, are here reproduced. All are drawn to the same scale. While such drawings give some idea of relative size, general markings and characteristic postures, they give no idea of the beautiful salt-and-pepper pattern of such young birds as Least, Semipalmated and Red-backed Sandpipers. Nor can one see the golden color of a young Northern Phalarope or the sulphur yellow of a young Hudsonian Curlew. The birds were drawn from life and their ages accurately known in most cases. A minus sign (meaning *less*) or a plus and minus sign (meaning *more or less*) is placed before the stated age of the specimens figured when there was any question about this point.

The bibliography at the end of this paper brings together a number of Churchill items. This may be convenient for future workers. We have not included the many Tree Sparrow papers by Marguerite Heydweiller Baumgartner, published in various journals, some of which deal at length with work done in the Churchill area.

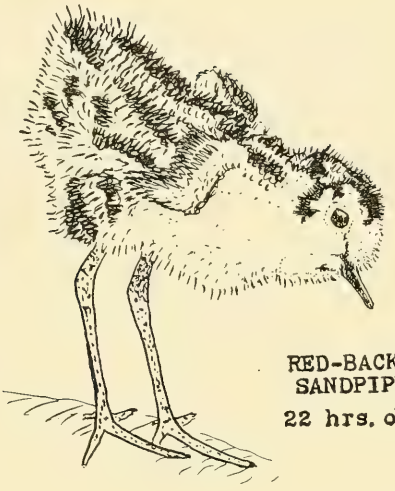
ANNOTATED LIST

PACIFIC LOON (*Gavia arctica*).— A pair was seen in the Reservoir on our first trip there on June 3. On June 15 a nest with two eggs


PACIFIC LOON
1 day old
WILLOW
PTARMIGAN
12 hrs old
HUDSONIAN
CURLEW
4 hrs. old
OLD-SQUAW
-12 hrs. old
Inches
Centimeters



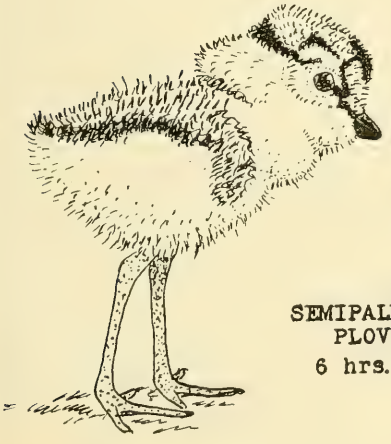
SEMIPALMATED SANDPIPER
12 hrs. old



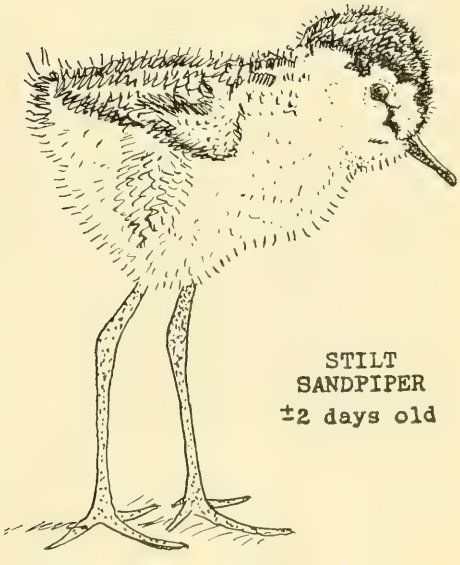
RED-BACKED SANDPIPER
22 hrs. old

LEAST SANDPIPER
6 hrs. old

NORTHERN PHALAROPE
6 hrs. old



SEMIPALMATED PLOVER
6 hrs. old



STILT SANDPIPER
±2 days old

NORTHERN PHALAROPE (*Lobipes lobatus*).—These birds were numerous when we arrived and all during our stay. Three nests were found on wet tundra. Two were located on June 17 and the third on July 8. The four eggs of the last found nest hatched July 9. The male only was present at the hatching and he ate the shells as fast as the young emerged from them.

PARASITIC JAEGER (*Stercorarius parasiticus*).—This bird was more plentiful than the next species. No nests were found, however.

LONG-TAILED JAEGER (*Stercorarius longicaudus*).—A few were seen at different times, often in company with Parasitic Jaegers.

HERRING GULL (*Larus argentatus*).—This common species nested inland rather than near the Bay in the vicinity of Churchill. Eggs removed from a nest on a rock in a pond were found to have been replaced by a second clutch on June 27.

BONAPARTE'S GULL (*Larus philadelphia*).—These birds were still flocking in the Townsite slough on June 2. However, they soon dispersed and sought nesting places in forested areas. A juvenal individual was seen at the Townsite slough on July 22.

ARCTIC TERN (*Sterna paradisaea*).—This species nested in large numbers in the area we covered. Small colonies were usually on islets in ponds, while numerous scattered pairs nested on dry tundra away from water.

SNOWY OWL (*Nyctea nyctea*).—None were seen, but pellets several months old were found along the pipeline leading from the Reservoir to town. These contained only *Microtus* and *Dicrostonyx* remains.

SHORT-EARED OWL (*Asio flammeus*).—This species was seen frequently from July 2 on. A nest was found on dry tundra a half mile northeast of camp on July 5. It contained four eggs and two young, but either an egg or chick vanished later in the day. Five owlets were in the nest on the evening of July 22 when the spot was visited for the last time. Lemmings (*Dicrostonyx*) were the chief food brought to the nest.

FLICKER (*Colaptes auratus*).—We saw a pair of these birds at intervals after July 14 and found that they had drilled a hole under the eaves of the Pumping Plant and were nesting within the building. This solved the problem of securing a nesting site, since, with the exception of telephone poles, there was no sizeable timber in the area.

*EASTERN PHOEBE (*Sayornis phoebe*).—Farley (1939: 56) reported two birds at the Gravel Pit in late June, 1938.

*YELLOW-BELLIED FLYCATCHER (*Empidonax flaviventris*).—Farley (1940a: 14) reported a specimen taken on July 15, 1939, five miles south of Churchill.

HORNED LARK (*Otocoris alpestris*).—The specimens which we secured are apparently intermediate between Hoyt's and the Northern race, but nearer the latter. We found many lark nests, the first containing five eggs, on June 4. One brood of young observed had a nestling period of nine to ten days.

TREE SWALLOW (*Iridoprocne bicolor*).—A pair or two nested in bird houses at Churchill.

CANADA JAY (*Perisoreus canadensis*).—A sooty immature bird was collected on the plateau above the Gravel Pit on June 28.

*BLUE JAY (*Cyanocitta cristata*).—An adult was seen by Palmer on June 19 just east of the Reservoir. This removes the bird from the hypothetical list of Taverner and Sutton (1934: 64).

*RED-BREASTED NUTHATCH (*Sitta canadensis*).—Taverner and Sutton (p. 66) placed this bird in the hypothetical list on the basis of an old record from about fifty-five miles south of Churchill. Baumgartner (1936) reported seeing one near Lake Isabelle at Churchill on August 4, 1934.

ROBIN (*Turdus migratorius*).—Robins were common but notably shy. On July 8, a nest with four eggs was found near camp in a bush, about four feet from the ground. Robins nested in June on the high rafters of a shed in town.

GRAY-CHEEKED THRUSH (*Hylocichla minima*).—A few were seen in forested places.

AMERICAN PIPIT (*Anthus spinoletta*).—This species was seen regularly on the rocks near the Bay, but no evidence of nesting was found.

*WHITE-RUMPED SHRIKE (*Lanius ludovicianus*).—A bird taken on July 1, 1938, has been recorded by Farley (1939: 56) as *L. l. excubitorides*. In 1940 a pair of shrikes of undetermined sub-species nested east of the Pumping Station. Two adults with two young were present on July 12.

*STARLING (*Sturnus vulgaris*).—A single bird was seen by Palmer in town during the first week in June, probably June 4. The bird was observed both in flight and on the ground. It is interesting to speculate on how this bird got to Churchill, from which place it has not previously been recorded. Unfortunately we did not collect the bird.

*PHILADELPHIA VIREO (*Vireo philadelphicus*).—On June 29, 1934, Dr. A. A. Allen saw and heard a bird of this species. It was in a shrubby growth in a marshy area within a quarter mile of the Reservoir.

YELLOW WARBLER (*Dendroica aestiva*).—This species was fairly common. One was seen on July 7, hopping around the ruined interior of Fort Churchill, while a pair nested in a bush near one of the houses in town.

BLACK-POLL WARBLER (*Dendroica striata*).—This species was common in forested areas. It was first observed on June 9.

NORTHERN WATER-THRUSH (*Seiurus noveboracensis*).—One was singing vigorously on June 9 on a spruce top in a forested section.

ENGLISH SPARROW (*Passer domesticus*).—We did not look for these birds on our arrival, but saw a number of them about the grain elevator, during the latter part of our stay. Weaver (1939: 97) states that these birds survive the winter at Churchill by inhabiting the railroad roundhouse and there receiving food and shelter from man.

*YELLOW-HEADED BLACKBIRD (*Xanthocephalus xanthocephalus*).—A male was clearly observed by Grinnell to rise from a marsh at the edge of a pond a quarter mile north of our camp. This species has not hitherto been recorded from Churchill.

*RED-WINGED BLACKBIRD (*Angelaius phoniceus*).—Farley (1938: 119) reported that Wilk saw a male at Churchill on June 21, 1937, and two males on July 6 of that year. Also see Farley (1939: 57). We saw a bird of this species near the Townsite slough on June 14, 1940.

RUSTY BLACKBIRD (*Euphagus carolinus*).—This species was common about the ponds near the Reservoir.

HOARY REDPOLL (*Acanthis hornemanni*).—We found *A. h. exilipes* far less common, but usually in company with the following species.

COMMON REDPOLL (*Acanthis linaria*).[1]—This bird was quite common and nine nests were found. Hatchings occurred between June 12 (which seems quite early) and July 21.

*PINE SISKIN (*Spinus pinus*).—A pair of these birds were seen by Farley (1938: 119) on June 16, 1937.

SAVANNAH SPARROW (*Passerculus sandwichensis*).—This bird was common.

TREE SPARROW (*Spizella arborea*).—This species was abundant. On July 8, northeast of the Reservoir, a nest containing four young was found on the ground and partly protected by a spruce.

*CHIPPING SPARROW (*Spizella passerina*).—Farley (1940a: 14) reported a singing male collected by Wilk, north of the Gravel Pit, on July 14, 1939, as *S. p. passerina*. A specimen collected by Baumgartner (1936) near Lake Isabelle on July 11, 1934, was referred to the western race, *arizonae*, by Mr. James Peters.

HARRIS'S SPARROW (*Zonotrichia querula*).—A few were seen among the spruces. On July 9, the excited calls of a pair of adults attracted our attention to a young bird which had left its nest and was hidden under dense spruce boughs.

WHITE-CROWNED SPARROW (*Zonotrichia leucophrys*).—We found *Z. l. leucophrys* to be quite common. On June 14, a nest was located on the ground, close under a rocky ridge, near the Radio Station. *Z. l. gambeli* was also present. We collected specimens of both so-called races. The latter has a pink bill, which shows up well in one of our Kodachrome pictures.

LINCOLN'S SPARROW (*Melospiza lincolni*).—Two were seen and heard singing on June 11, east of the Reservoir.

*SONG SPARROW (*Melospiza melodia*).—Dr. A. A. Allen saw one on June 8, 1934, and heard one singing on June 22 of the same year.

SWAMP SPARROW (*Melospiza georgiana*).—Two were singing near camp on June 10.

LAPLAND LONGSPUR (*Calcarius lapponicus*).—This species was abundant and omnipresent on the tundra. We fed them in front of the camp. Of the four nests found, the earliest was located on June 17.

SMITH'S LONGSPUR (*Calcarius pictus*).—These birds were less numerous than the above species. We found no nests. Their song was heard regularly for a number of days after that of the Lapland Longspurs had become less in evidence, possibly suggesting a later nesting period.

SNOW BUNTING (*Plectrophenax nivalis*).—Many were present in town on June 3. Later some were seen on the rocks near the Bay, but we found no positive evidence of nesting. A fair-sized flock was feeding on wheat near the elevator on July 22.

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1. A paper dealing with our life history work on this species will appear elsewhere later.

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*RANGE EXTENSIONS FOR SOME CRUCIFERS**

By HERBERT GROH

EXTENSION of range may be actual, as it is with several of the more recently introduced weeds to be reported below; or it may represent merely more adequate knowledge of existing range of stabilized adventive, or of indigenous, species as in the case of the plant first to be noticed.

No attempt has been made to assemble all the information that might be had regarding Canadian distribution of these plants, but additional records for the Canadian Weed Survey of this Division will be always welcome. Only specimens in the National Herbarium at Ottawa (distinguished by the letters Can) and from the Division of Botany have been examined.

Sisymbrium salsugineum Pallas (*Arabidopsis glauca* Rydb. Fl. Rocky Mountains, p. 342, 1917).—Although ranging widely from Siberia, through Arctic North America to Montana and Idaho and apparently Colorado, this native crucifer is not often collected. Payson (Univ. Wyoming, Publ Sc. 1: 1-27, 1922.) remarked that it "seems to have been collected but four times in North America," but did not mention the reference to Alberta occurrence on page 342 of Rydberg's *Flora.* This occurrence and that reported by Richardson (according to Hooker, *Flora Boreali-Americana*) from "shores of the Arctic Sea" can be extended considerably in Canada now. The following specimens have been examined.

MANITOBA: Brookside, Winnipeg West, *W. A. Burman,* Aug. 25, 1900, bare spot, probably alkaline; Cartwright, *W. A. Burman,* no date on label.

SASKATCHEWAN: Parkbeg, *J. Macoun,* June 23, 1876, by a saline pool (Can); west of Saskatoon. *J. Macoun,* by a brackish lake (Can); Nokomis, *H. Groh,* July 8, 1935, alkaline depression.

ALBERTA: St. Albert, *T. N. Willing,* Oct. 1, 1899; prairie near Salt River, near Heart (Raup) Lake about 59° 41′ N., 111° 56′ W., *Hugh M. Raup* 2483, Aug. 20, 1928 (Can); near Mission Farm, about 59° 57′ 30″ N., 112° 17′ W., *Hugh M. Raup* 2482, June 15, 1928 (Can).

BRITISH COLUMBIA: 2 miles north of Windermere, *J. W. Eastham,* July 14, 1939, dry ground probably with some alkali. These plants were from a few inches to less than a foot in height and all in flower and fruit.

Plants of this species are annual, glabrous and even glaucous, branching with spreading and somewhat sinuous stems, with entire leaves, mostly ovate, sessile and clasping. The inflorescence of rather inconspicuous white flowers elongates in fruit, which consists of slender pods less than an inch in length and containing minute brown seeds.

Sisymbrium Loeselii L. Loesel's Mustard.—At Kamloops, on July 21, 1939, this mustard was found apparently for the first time in British

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Columbia. It was spread along a few miles of road toward Campbell's Creek, and was in remarkable profusion at one place along the road to Tranquille, and was found in the Indian Reserve near the town. Canadian specimens seen, some of them previously reported (Groh, Sci. Agr. 13: 725, 1933.) are:

ONTARIO: Port Arthur, *H. Groh,* Sept. 22, 1934, siding.

MANITOBA: south of Brandon, *H. Groh,* June 20, 1932, along highway.

SASKATCHEWAN: Stoney Beach, *W. G. Palmer,* Aug. 1929, *H. Groh,* July 23, 1933, railway yards; Carlyle, *H. Groh,* June 27, 1932; Lebret, *W. Shevkenek,* June 26, 1938, roadside.

ALBERTA: Fort Saskatchewan, *G. H. Turner,* June 26, 1936, wheat field.

BRITISH COLUMBIA: Kamloops, *H. Groh,* July 21, 1939, roadsides (in three directions).

Erucastrum gallicum (Willd.) O. E. Schulz. Dog Mustard.—Although first collected in Canada at Emerson, Man., by the writer in 1922, this weed was not reported until 1933 (Sci. Agi. 13: 722-725.) by which time specimens were at hand from several provinces. Extensions of known range were published in 1934 (Can. Field-Nat. 48: 10-11), 1935 (Rep. Que. Soc. Prot. Pl. 1934-1935: 65-67) and 1939 (Can. Field-Nat. 53: 39). With its collection on the railway at Kamloops, B.C., on July 20, 1939, it can now be reported as occurring in all provinces. It is predominantly a railroad and wayside weed but has proved in various places its ability to infest crops.

Cardaria Draba (L.) Desv. var. *repens* (Schrenk) O. E. Schulz (*Pepidium Draba* L. var. *repens* (Schrenk) Thell.) Lens-podded Hoary Cress—In a paper which appeared in Aug., 1940 (Groh, Sci. Agr. 20: 750-756, 1940), citations were included of several specimens from each of the three westernmost provinces. Subsequently a specimen which had been collected by Mr. George Batho at Deloraine, Man. came to notice and extended the known range into another province eastward. Although now known to have been present at Grande Prairie, Alta., since 1926, this variety of hoary cress had not been reported in Canada until this past year. Associated with it at Grande Prairie was *Cardaria pubescens* (C. A. Meyer) Rollins var. *elongata* Rollins (Rollins, Rhodora 42: 302-306, 1940.) known heretofore as *Hymenophysa pubescens* C. A. Meyer, also reported for the first time in Canada, although a specimen had been received from that locality as early as 1928. In another paper (Groh, Sci. Agr. 21: 36-43, 1940), evidence has been adduced to show that these two weeds were probably introduced early in this century in alfalfa seed from Turkestan or neighbouring parts of Russia.

Lepidium latifolium L.—Specimens of this species collected in the yards of the C.N.R. shops in Quebec city on July 29, 1934, by Brother Marie-Anselm were identified by Mr. E. W. Hart, of this Division (Prog. Rep. of Dom. Bot. 1931-1934, p. 12, 1935). This has remained the only Canadian record until in 1940 a specimen from near Lethbridge, Alta., was sent by Mr. K. W. Hill, Dominion Experimental Station, Lethbridge, to Dr. E. H. Moss, University of Alberta, and by Dr. Moss for confirmation of his identification to the Division of Botany. Only a few plants were found on irrigated land near the edge of a natural slough in soil judged to be somewhat saline. The perennial rootstocks possessed by this plant would suggest that it may prove to be a persistent weed.

Lepidium perfoliatum L. Clasping-leaved Cress —Since publication of the occurrence of this weed at Cranbrook and Osoyoos, B.C., (Groh, Can. Field-Nat. 46: 48-49, 1932) one additional station has been reported. A specimen from a railway right of way 1½ miles east of Swift Current, Sask., was collected by Mr. Arch. C. Budd, June 23, 1936. Another specimen from roadsides at the same place, collected by Mr. J. A. Campbell, June 25, 1937, has been received.

Rorippa austriaca (Crantz) Besser—A specimen sent from Fort Saskatchewan, Alta., July 15, 1940, by Dr. G. H. Turner, is a new record for that province. The plant has been reported previously in Canada only from Greenstreet, Sask., where it was collected in 1933 by Mr. Jas. L. Patmore (Groh, Sci. Agr. 13: 725, 1933.)

Rorippa sylvestris (L.) Besser. Creeping Yellow Cress—This pernicious weed has been recorded from coast to coast (Groh, Sci. Agr. 16: 331-334, 1936.) although sparingly from the Prairie Provinces. Collections made in 1939 at Prince Rupert and Smithers, B.C., are the only ones seen from along this northern line of railway. It was also collected at Revelstoke and at some new points in the lower Fraser Valley, and from the prairies at Regina, Sask.

A STUDY OF THE FLORA OF WELLINGTON COUNTY, ONTARIO

By JOHN J. STROUD

THE PRESENT work represents a survey of the plants growing without cultivation in the County of Wellington, Ontario, based upon collections made especially during the years 1937 to 1939, with a few additional specimens collected in 1934 and 1936. In order to make the check list as complete as possible, various institutional and private herbaria were examined. In addition, from the review of literature, reports of the occurrence of species which might not have been placed in these herbaria, or were in herbaria not visited, were secured. From all these sources a catalogue list of a total of 1,147 species has been compiled for the county, of which 864 were collected by the author, while 269 represent collections secured from herbaria, and references to the remaining 14 species were obtained from the literature.

Acknowledgments. The writer wishes to acknowledge the kind assistance he has received from many persons in charge of the various herbaria he has visited. Especially does he desire to thank Professor J. E. Howitt of the Ontario Agricultural College, Dr. T. M. C. Taylor of the University of Toronto, Dr. G Krotkov of Queen's University, Dr. H. A. Senn of the Division of Botany, Science Service, Department of Agriculture, Ottawa, and Mr. A. E. Porsild of the National Museum, Ottawa, who permitted the use of the herbaria in their care. To Mr. Monroe Landon I am especially indebted for the use of his herbarium which includes the fine collection of William Herriot. Mr. Hubert Brown of Toronto was also exceedingly kind and helpful while allowing the use of his private herbarium consisting of a collection made from numerous counties of the province. From Mr. Gordon McNair of Hamilton, reports of some locally known plant stations were also secured. The author above all wishes to extend to Dr. L. O. Gaiser of McMaster University his appreciation of her efforts in discussing and accumulating data on this subject as a thesis problem for the Master of Arts degree.

Other Collectors of the Vicinity. Due to the location of the Ontario Agricultural College in the County of Wellington, the flora has been studied by many persons from the institution, and reference will be made to many there who have collected extensively in the county.

Professor A. B. Klugh, while on the staff of the college, made a very comprehensive study of several families of the county, publishing articles on the genus *Aster*(1) and the family *Cyperaceae*.(2) Most of his collecting was done from 1903 to 1905; the majority of those collections are now found at Queen's University, though a few are found at other institutions.

E. J. Colgate wrote an article on the *Orchidaceae* of Wellington County(3) but his collection (if such exists) has not been located. T. J. Moore(4) also wrote an article on the *Polypodiaceae* of the county, and T. D. Jarvis(5) on the *Gramineae*, but their collections too have not been seen by the author.

Professor J. E. Howitt, the present head of the Department of Botany of the Ontario Agricultural College, has made many collections in the region since 1906. Many of his staff have also collected in the vicinity, as the late Dr. R. E. Stone, W. G. Evans, E. W. Hart, W. H. Wright and S. A. Simmons, and their collections, located in the Ontario Agricultural College herbarium, have been included in this study.

Many undergraduate students at the same college made collections in the region, the most outstanding of those being that of Harold Corby, who as well as collecting generally in the county made a study of the *Compositae*.(6) J. M. Hamilton as an undergraduate in 1923 made a collection of plants, now in the herbarium of the University of Toronto.

Geographical Location. Wellington County is situated in the northern, central part of the Ontario Peninsula. Thus it lies in between the three Great Lakes with Lake Huron to the west, Lake Ontario to the east, and Lake Erie to the south. It extends roughly from 43° 20′ to 44° north latitude, and from 80° to 81° west longitude.

Geology of the Region. According to Williams, Wellington County is entirely underlain by rocks of Silurian age, extending in belts running north and south, with only very limited actual exposures. The easternmost of these is the Lockport dolomite, or "Niagara limestone" as it was formerly called, the most conspicuous of the Palaeozoic rocks, forming the Niagara escarpment; in this belt are found such villages as Rockwood, Eden Mills, Erin and Arkell.

Westward occurs the Guelph formation, a great dolomite formation of fairly uniform character which, unlike the underlying Lockport, does not occur as prominent cliffs in this county; it is about thirteen miles wide and is exposed in the valleys of streams and rivers, notably the Grand and Speed Rivers, on which are situated Guelph, Flora and Fergus. Further west is the Salina formation with gray, green and red shales containing gray dolomite, salt and gypsum; Arthur, Mount Forest and Harriston are located in this belt. A belt of Akron dolomite and Bertie waterline formation, and a very small strip of underlying Detroit River Series of Devonian rock, passes through a small portion of the northwestern part of the county near Palmerston.

According to Coleman (8) the Niagara district was crossed three times by ice sheets advancing south-westward from central Quebec. Taylor(10) estimated that during the maximum extent of the final or Wisconsin ice sheet, its greatest depth was approximately 3,000 feet in the Niagara district. Coleman(8, 9) showed that all the ice invasions left drift deposits on the bed rock, the later deposits replacing the earlier ones, so that the present shaping of the county is largely due to the deposits of the final ice sheet. The most fundamental type of deposit in the region is glacial till, a soil of a great range of particle size, mixed with pebbles and rocks gathered from various widely-separated areas; in some places it has been formed into long, low, gently sloping domes called drumlins. Due to the deposition of glacial debris in such a manner as to obstruct the drainage of valleys, a large number of swamps and bogs were formed in the region.

Climate. The weather records of the Meteorological Stations at Guelph and Mount Forest may be taken as representative of the southern and northern regions of Wellington County.(11) The mean temperature for July is 68°F. at Guelph, and 65° at Mount Forest; mean January temperatures are 20° for Guelph and 18° for Mount Forest.

The mean monthly minimum temperature is less than 32° for five months of the year at Guelph, and for six months at Mount Forest, and above 45° for four of the months at both stations. Chapman (12) in his map shows that the north-eastern portion of Wellington County has nearly 126 days between the last killing frost in the spring and the first frost in the fall. Most of the county (including Mount Forest) has an average of from 126 to 133 frost-free days but a small southern portion shows an increase to nearly 140 days, with Guelph roughly on the 135-day line.

With regard to precipitation, the normal annual figure for Guelph is slightly over 28 inches, while that for Mount Forest is 35 inches. This precipitation is ample for the vegetation and is well distributed throughout the growing season, thus decreasing the probability of droughts. The amount of bright sunshine recorded at Guelph totals on the average 1,685 hours for the year.

Types of Vegetation. Macoun and Malte(13) divided the flora of Canada into several zones, those represented in Ontario being the Sub-Arctic, Eastern Hardwood and the Carolinian or Interlacustrine. They outlined the Carolinian zone as that part of Ontario lying south approximately of a line drawn from Toronto on the northern shore of Lake Ontario to Windsor. North of this zone was the Eastern Hardwood zone which extended to the Sub-Arctic region. Thus, it would seem that Wellington County would lie almost entirely in the Eastern Hardwood Zone. All the trees included in their discussion of this zone are represented in Wellington County with the exception of *Pinus resinosa,* for which neither a record nor a specimen has so far been found. Of the shrubs mentioned by them, all have been recorded except *Viburnum alnifolium,* while of the herbaceous plants *Trillium undulatum* and *Uvularia perfoliata* are the only ones not included. Of the Carolinian zone they state:

> "The herbaceous vegetation is very rich, at least a hundred species occurring nowhere else in Canada being found in the zone."

Of the trees characteristic of the region listed, no indigenous representatives were found in Wellington County with the exception of *Castanea dentata* for which I have but the one report of Herriot (14):

> "extending sparingly a few miles north-eastward into Wellington County."

Of the herbaceous vegetation seven species only, namely: *Podophyllum peltatum, Asclepias phytolaccoides, Monarda didyma, Campanula americana, Lobelia siphilitica, Cypripedium hirsutum* and *Panax quinque-folium* were encountered in Wellington County.

Adams (15, 16) revised the extent of the floral zones slightly so as to include in the Carolinian all of Ontario lying south of a line joining the

cities of Toronto and Sarnia. Following Adams' division it would appear that a small southern part of Wellington County would be in the Carolinian zone, though most of it would still remain in the Eastern Hardwood region. The particular Carolinian flora was expressed by Adams as follows:

> "There are eleven families found in this region which do not occur elsewhere in Canada. These with the genera contained in them are as follows: *Dioscoreaceae - Dioscorea; Saururaceae - Saururus; Moraceae - Morus; Anonaceae - Asimina; Magnoliaceae - Liriodendron, Magnolia; Phytolaccaceae - Phytolacca; Lauraceae - Benzoin, Sassafras; Platanaceae - Platanus; Cassiaceae - Cercis, Gleditschia, Gymnocladus; Melastomaceae - Rhexia; Bignoniaceae - Tecoma.*"

Not a single representative of these fifteen genera was found in my survey of Wellington County as indigenous. Of the actual species listed along with the eleven families as "confined to this area" I have found the following: Of trees: two species of oak (*Quercus macrocarpa* and *Q. rubra*); of shrubs: *Smilax hispida*. The only one of these not included in Macoun and Malte's list of Carolinian plants is *Smilax hispida*.

Thus it appears that the southern part of Wellington County is a transition zone between the more southern Carolinian floral region and the more northern Eastern Hardwood zone. As any such division of floral zones could only be approximate and could not be delimited in this manner, we should expect, as we have found, a slight overlapping of Carolinian elements with the Eastern Hardwood elements.

Check List of the Flora of Wellington County, Ontario. The scientific names of the plants used in this list have been adapted from Robinson & Fernald.[17] In some cases where this work did not cover certain species, the name used was that of Britton and Brown.[18] Many emendations to these works have occurred since the publication of these manuals, and where an emended name has superseded the one of Gray's Manual, the latter name follows in parenthesis. Most of the changes have been recorded in *Rhodora*, and the revised nomenclature of Wiegand and Eames[19] has made most of these emended names available for the local species. In the case of the *Polypodiaceae*, where such general revision has occurred, Broun[20] has been followed.

Non-native or introduced species are indicated in the usual way by an asterisk prefixed.

PTERIDOPHYTA

POLYPODIACEAE

Pteretis nodulosa (Michx.) Nieuwl. (*Onoclea Struthiopteris* (L.) Hoffm.)

Onoclea sensibilis L.

Cystopteris bulbifera (L.) Bernh.

C. fragilis (L.) Bernh.

Dryopteris Thelypteris (L.) A. Gray, var. *pubescens* (Lawson) A. R. Prince. (*Aspidium Thelypteris* (L.) Sw.)

D. noveboracensis (L.) A. Gray. (*Aspidium noveboracense* (L.) Sw.)

D. marginalis (L.) A. Gray. (*Aspidium marginale* (L.) Sw.)

†*D. Goldiana* (Hook.) Underw. (*Aspidium Bootianum* Hook.)

D. Boottii (Tuckerm.) Underw. (*Aspidium Boottii* Tuckerm.)

D. cristata (L.) A. Gray. (*Aspidium cristatum* (L.) Sw.)

D. Clintoniana (D. C. Eaton) Dowell. *Aspidium cristatum* (L.) Sw.) var. *Clintonianum* D. C. Eaton.)

D. spinulosa (O. F. Muell.) Watt. (*Aspidium spinulosum* (O. F. Muell) Sw.)

D. intermedia (Muhl.) A. Gray. (*Aspidium spinulosum* (O. F. Muell.) Sw., var. *intermedium* (Muhl.) D. C. Eaton.)

D. dilatata (Hoffm.) A. Gray. (*Aspidium spinulosum* (O. F. Muell.) Sw., var. *dilatatum* (Hoffm.) Hook.)

Phegopteris polypodioides Fée.

P. Dryopteris (L.) Fée.

Polystichum acrostichoides (Michx.) Schott.

Athyrium angustum (Willd.) Presl. (*Asplenium Filix-femina* (L.) Bernh.)

Diplazium pycnocarpon (Spreng.) Broun. (*Asplenium angustifolium* Michx.)

D. thelypteroides (Michx.) Presl. (*Asplenium acrostichoides* Sw.)

Camptosorus rhizophyllus (L.) Link.

Asplenium viride Huds.

A. Trichomanes L.

Pellaea atropurpurea (L.) Link.

Cryptogramma Stelleri (Gmel.) Prantl.

Adiantum pedatum L.

Pteridium latiusculum (Desv.) Hieron. (*Pteris aquilina* L.)

Polypodium virginianum L. (*P. vulgare* L.)

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†This rare fern had previously (as far as my records went) only been reported as being found in Wellington County in a note by T. J. Moore, Ferns of Wellington County, Ontario Natural Science Bulletin: 3: 12-14, 1907. The author found a fine clump about a mile from the Ontario Agricultural College.

OSMUNDACEAE

Osmunda regalis L., var. *spectabilis* (Willd.) A. Gray. (*O. regalis* L.)
O. Claytoniana L.
O. cinnamomea L.
O. cinnamomea L., forma *frondosa* (Torr. & A. Gray) Britton (var. *frondosa* Gray)

OPHIOGLOSSACEAE

Botrychium virginianum (L.) Sw.

EQUISETACEAE

Equisetum arvense L.
E. sylvaticum L., var *pauciramosum* Milde. (*E. sylvaticum* L.)
E. limosum L. (*E. fluviatile* L.)
E. hyemale L.
E. scirpoides Michx.

LYCOPODIACEAE

Lycopodium lucidulum Michx.
L. annotinum L.
L. clavatum L.
L. obscurum L.

SPERMATOPHYTA

GYMNOSPERMAE

TAXACEAE

Taxus canadensis Marsh.

PINACEAE

Pinus Strobus L.
**P. sylvestris* L.
Larix laricina (Du Roi) Koch.
Picea mariana (Mill.) BSP.
**P. Abies* (L.) Karst.
Abies balsamea (L.) Mill.
Tsuga canadensis (L.) Carr.
Thuja occidentalis L.
Juniperus communis L.
J. horizontalis Moench.
J. virginiana L.

ANGIOSPERMAE

TYPHACEAE

Typha latifolia L.
T. angustifolia L.

SPARGANIACEAE

Sparganium eurycarpum Engelm.
S. multipedunculatum (Morong) Rydb. (*S. simplex* Huds.)

NAJADACEAE

Potamogeton natans L.
P. gramineus L., var. *graminifolius* Fries. (*P. heterophyllus* Schreb.)
P. zosteriformis Fernald. (*P. zosterifolius* Schumacher.)
P. pectinatus L.
P. illinoensis Morong. (*P. lucens* L.)
P. praelongus Walt.
P. pusillus L., var *tenuissimus* Mertens & Koch.

JUNCAGINACEAE

Scheuchzeria palustris L., var. *americana* Fernald. (*S. palustris* L.)
Triglochin maritima L.
T. palustris L.

ALISMACEAE

Sagittaria latifolia Willd.
S. latifolia Willd., var. *obtusa* (Muhl.) Wiegand. (forma *obtusa* (Muhl.) Robinson.)
S. latifolia Willd. forma *gracilis* (Pursh) Robinson.
S. heterophylla Pursh.
S. graminea Michx.
Alisma Plantago-aquatica L.

HYDROCHARITACEAE

Elodea canadensis Michx.
Vallisneria americana Michx. (*V. spiralis* L.)

GRAMINEAE

**Bromus secalinus* L.
**B. racemosus* L.
**B. hordeaceus* L.
**B. commutatus* Schrad.
**B. arvensis* L.
**B. tectorum* L.
B. ciliatus L.
B. Pumpellianus Scribn.
**B. inermis* Leyss.
Bromelica striata (Michx.) Farwell. (*Melica striata* (Michx.) Hitchc.)
Melica mutica Walt.
Festuca rubra L.
F. ovina L.
F. ovina L., var. *duriuscula* (L.) Koch.
**F. elatior* L.
F. elatior L., var. *arundinacea* (Schreb.) Wimm.
F. nutans Spreng.
Glyceria canadensis (Michx.) Trin.
G. striata (Lam.) Hitchc. (*G. nervata* (Willd.) Trin.)
G. grandis S. Wats.
G. fluitans (L.) R.Br.
G. septentrionalis Hitchc.
G. borealis (Nash) Batchelder.
Puccinellia distans (L.) Parl.
**Poa annua* L.
**P. compressa* L.
P. nemoralis L.
P. palustris L. (*P. triflora* Gilib.)
P. pratensis L.
P. debilis Torr.
P. alsodes A. Gray.
**Eragrostis cilianensis* (All.) Link. (*E. megastachya* (Koeler) Link).
**Dactylis glomerata* (L.) Beauv.
**Cynosurus cristatus* L.

Agropyron Smithii Rydb.
**A. repens* (L.) Beauv.
A. caninum (L.) Beauv.
A. caninum (L.) Beauv., var. *tenerum* (Vasey) Pease & Moore. (*A. tenerum* Vasey.)
A. caninum (L.) Beauv., var. *unilaterale* (Cassidy) Vasey. (*A. Richardsonii* Schrad.)
**A. cristatum* (L.) Gaertn.
**Lolium perenne* L.
**L. multiflorum* Lam.
**L. temulentum* L.
Elymus virginicus L.
E. canadensis L.
**Secale cereale* L.
Asprella Hystrix (L.) Hum. (*Hystrix patula* Moench.)
Hordeum jubatum L.
Sphenopholis pallens (Spreng.) Scribn.
**Trisetum flavescens* (L.) Beauv.
**Avena fatua L.*
**A. sativa* L.
Schizachne purpurascens (Torr.) Swallen. (*Avena striata* Michx.)
**Arrhenatherum elatius* (L.) Beauv.
Deschampsia caespitosa (L.) Beauv.
Koeleria cristata (L.) Pers.
**Ginannia lanata* (L.) Hub. (*Holcus lantatus* L.)
Danthonia spicata (L.) Beauv.
Calamagrostis canadensis (Michx.) Beauv.
Agrostis stolonifera L. (*A. alba* L.)
A. tenuis Sibth. (*A. alba* L., var. *vulgaris* With.) Thurb.)
A. scabra Willd. (*A. hyemalis* (Walt) BSP.
Cinna arundinacea L.
C. latifolia (Trev.) Griseb.
Sporobolus vaginiflorus (Torr.) Wood.
S. cryptandrus (Torr.) Gray.
**Alopecurus pratensis* L.
A. aequalis Sobol. (*A. geniculatus* L., var. *aristulatus* Torr.)
**Phleum pratense* L.
Muhlenbergia sylvatica Torr.
M. mexicana (L.) Trin.
M. racemosa (Michx.) BSP.
Milium effusum L.
Oryzopsis asperifolia Michx.
Spartina cynosuroides (L.) Roth.
Hierochloë odorata (L.) Wahlenb.
**Anthoxanthum odoratum* L.
**Phalaris canariensis* L.
P. arundinacea L.
P. arundinacea L., var. *picta* L.
Leersia virginica Willd.
L. oryzoides (L.) Sw.
Zizania palustris L. (*Z. aquatica* L.)
**Digitaria Ischaemum* Schreb. (*D. humifusa* Pers.)
**D. sanguinalis* (L.) Scop.
Echinochloa crusgalli (L.) Beauv.
E. frumentacea (Roxb.) Link.
Panicum capillare L.
**P. miliaceum* L.
P. virgatum L.
P. agrostoides Spreng.
P. depauperatum Muhl.
P. linearifolium Scribn.
P. lanuginosum Ell., var. *implicatum* (Scribn.) Fernald. (*P. implicatum* Scribn.)
P. latifolium L.
**Setaria lutescens* (Weigel) Hub. (*S. glauca* (L.) Beauv.)
**S. verticillata* (L.) Beauv.
**S. viridis* (L.) Beauv.
**S. italica* (L.) Beauv.
Andropogon furcatus Muhl.

CYPERACEAE

Cyperus rivularis Kunth.
C. strigosus L.
Dulichium arundinaceum (L.) Britt.
Eleocharis capitata (L.) R.Br.
E. ovata (Roth.) R. & S.
E. palustris (L.) R. & S.
E. acicularis (L.) R. & S.
E. tenuis (Willd.) Schultes.
E. compressa Sull. (*E. acuminata* (Muhl.) Nees.
Scirpus validus Vahl.
S. fluviatilis (Torr.) Gray.
S. atrovirens Muhl.
S. atrovirens Muhl., var. *georgianus* (Harper) Fernald. (*S. georgianus* Harper.)
S. lineatus Michx.
S. cyperinus (L.) Kunth.
S. Eriophorum Michx.
Eriophorum spissum Fernald. (*E. callitrix* Cham.)
E. gracile Roth.
E. tenellum Nutt.
E. angustifolium Roth.
E. viridi-carinatum (Engelm.) Fernald.
E. viridi-carinatum (Engelm.) Fernald, var. *Fellowsii* Fernald.
E. virginicum L.
Rynchospora alba (L.) Vahl.
Carex tribuloides Wahlenb.
C. projecta Mackenzie. (*C. tribuloides* Wahlenb., var. *reducta* Bailey.)
C. siccata Dewey.
C. Crawfordii Fernald.
C. cristata Schwein.

C. Bebbii Olney.
C. sychnocephala Carey.
C. gynocrates Wormsk.
C. stellulata Good.
C. muricata L. (*C. stellulata* Good., vars. *excelsior* (Bailey) Fernald and *cephalantha* (Bailey) Fernald.)
C. interior Bailey. (*C. scirpoides* Schkuhr.)
C. canescens L.
C. canescens L., var. *disjuncta* Fernald.
C. brunnescens Poir.
C. bromoides Schkuhr.
C. Deweyana Schwein.
C. tenuiflora Wahlenb.
C. trisperma Dewey.
C. disperma Dewey. (*C. tenella* Schkuhr.)
C. convoluta Mackenzie. (*C. rosea* Schkuhr.)
C. radiata (Wahl.) Small. (*C. rosea* Schkuhr., var. *radiata* Dewey.)
C. retroflexa Muhl.
C. sparganioides Muhl.
C. cephaloidea Dewey.
C. vulpinoidea Michx.
C. prairea Dewey. (*C. diandra* Schrank, var. *ramosa* (Boott) Fernald.)
C. stipata Muhl.
C. Sartwellii Dewey.
C. crinita Lam.
C. aquatilis Wahlenb.
C. stricta Lam. (including var. *angustata* (Boott) Bailey.)
C. aurea Nutt.
C. pauciflora Lightf.
C. leptalea Wahlenb.
C. gracillima Schwein.
C. Backii Boott.
C. Jamesii Schwein.
C. albicans Willd.
C. communis Bailey.
C. varia Muhl.
C. pennsylvanica Lam.
C. pubescens Muhl.
C. tetanica Schkuhr.
C. Woodii Dewey. (*C. tetanica* Schkuhr., var *Woodii* (Dewey) Bailey.)
C. vaginata Tausch.
C. paupercula Michx., var. *irrigua* (Wahlenb.) Fernald.
C. paupercula Michx., var. *pallens* Fernald.
C. limosa L.
C. eburnea Boott.
C. pedunculata Muhl.
C. plantaginea Lam.
C. Careyana Torr.
C. platyphylla Carey.
C. laxiculmis Schwein.
C. digitalis Willd.
C. laxiflora Lam.
C. anceps Muhl. (*C. laxiflora* Lam., var. *patulifolia* (Dewey) Carey)
C. blanda Dewey. (*C. laxiflora* Lam., var *varians* Bailey.)
C. albursina Sheldon. (*C. laxiflora* Lam., var. *latifolia* Boott.)
C. Hitchcockiana Dewey.
C. granularis Muhl.
C. flava L.
C. flava L., var. *elatior* Schlecht.
C. cryptolepis Mackenzie. (*C. flava* L., var. *rectirostra* Gaudin)
C. longirostris Torr.
C. castanea Wahlenb.
C. arctata Boott.
C. scabrata Schwein.
C. lasiocarpa Ehrh. (*C. filiformis* L.)
C. lanuginosa Michx.
C. vestita Willd.
C. trichocarpa Muhl.
C. trichocarpa Muhl., var. *aristata* (R. Br.) Bailey.)
C. riparia W. Curtis.
C. acutiformis Ehrh.
C. Pseudo-Cyperus L.
C. comosa Boott.
C. hystericina Muhl.
C. lurida Wahlenb.
C. Schweinitzii Dewey.
C. retrorsa Schwein.
C. gigantea Rudge. (*C. lupuliformis* Sartwell.)
C. lupulina Muhl.
C. intumescens Rudge.
C. intumescens Rudge, var. *Fernaldii* Bailey.
C. vesicaria L., var. *monile* (Tuckerm.) Fernald.
C. rostrata Stokes.
C. rostrata Stokes, var. *utriculata* (Boott) Bailey.
C. Tuckermani Dewey.

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(*To be continued*)

BOOK REVIEWS

AUDUBON'S AMERICA, The Narratives and Experiences of John James Audubon; *edited by Donald Culross Peattie. Large 8vo. pp. i-x,* 1-329, *with* 17 *coloured plates. Houghton Mifflin Company, Boston,* 1940. *Price* $6.00.

In recent years there has been a procession of Audubon books, but the volume in hand presents him to the general public more adequately than ever before. Audubon's ornithological and mammalogical works are needed for reference only by professional workers, and most birds have been better portrayed in colour since his time. Nevertheless, amateur naturalists of today all know that Audubon was a giant in his day, and they wish to have some knowledge of his work. They will surely welcome a picture that will enable them to see his stature for themselves.

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A beautifully printed book is made into a booklovers' treasure by the seventeen facsimile plates, some of which are of paintings wherein a genius for composition and colour was combined with good draughtmanship to produce portraits that will never be surpassed.—C. H. D. C.

WINGS AT MY WINDOW, *by Ada Clapham Govan, The Macmillan Company, Toronto and New York,* 1940. *Price* $2.75.

This is the story of the window and garden feeding of birds. It is most interestingly told, with a spice of occasional humor, many practical suggestings as to methods and interesting incidents, without too much humanizing of the acting characters. More than this it is the story of an invalid and family rising out of discouragement largely through a new view of and new interest in life, gained by an intimate study of nature at the window-sill and doorstep. The locale is a little town in Massachusetts; but while not many places can promise such a succession of winter birds in both species and individuals, some approximation can be obtained in almost any suburban situation. To all who like pleasant reading or the presence of nature close around them, with suggestions for its accomplishment, this book can be heartily recommended.—P. A. T.

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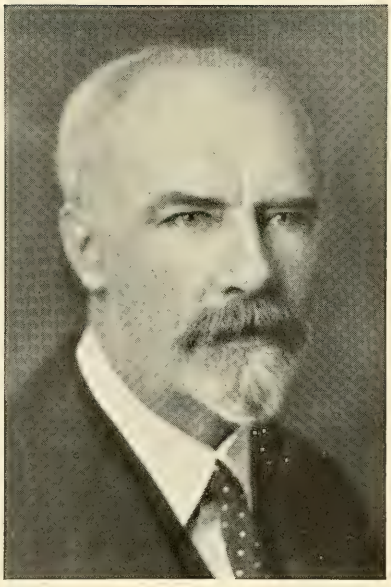

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JAMES HENRY FLEMING

1872 - 1940

AN APPRECIATION by P. A. TAVERNER

James Henry Fleming, the acknowledged dean of Canadian ornithology, born July 5, 1872, in Toronto, died at his home in the same city June 27, 1940, sincerely mourned by his personal friends and deeply regretted by many colleagues throughout the world.

Born of a Scotch father, who ran a pioneer seed growing business on ground (then) out Yonge Street, and a mother of English descent, he attended Public and Model schools and Upper Canada College. Later he travelled extensively in Europe, visiting the principal museums and making contact with eminent foreign correspondents with whom he never after lost touch. He saw Guiana, the Bahamas and many parts of the United States, and had the faculty wherever he went of making serious friendships and of absorbing information along many lines. His interests were catholic and he scarcely missed more academic training. He was elected British Empire Member of the British Ornithological Union; Member d'Honneur Etranger Société Ornithologique et Mammalogie de France; and Fellow of the American Ornithologists' Union. He served on the Council of the latter for a number of years and was finally elected its president 1932-1935. As with many prophets he was appreciated earlier abroad than at home; but he was appointed Honorary Curator of Birds in both the National Museum at Ottawa and his own home museum, the Royal Ontario. He was also Honorary Member of various natural history organizations in Toronto, to which he was a regular attendant at meetings, and where his quiet personality and occasional trenchant contributions were highly valued. In token of this appreciation the Brodie Club held a memorial meeting at which were read papers on various aspects of his life and work, which were afterwards collected under the title of The Fleming Memorial Papers and distributed to his friends and associates.

Fleming's interest in ornithology seems to have been spontaneous and evidenced at an early age. His first specimen was acquired in his early teens and is still in his collection. From then on his collection was consistently and progressively developed towards the definite, planned, objective of as complete as possible a representation of the birds of the world—a general survey of the whole subject rather than a specializing one. He did not collect in series but the final production was the most complete private synoptic collection of world birds anywhere. In this particular it is rivalled by only a few of the larger public collections in either America or abroad. It consists of representatives of all but three families of modern birds and 2,073 genera. It is particularly rich in rare, vanishing or extinct species, historical specimens and the more *outré* and spectacular types. Owing to changed conditions, both passing and permanent, it is unlikely that such a collection can ever be made again. Along with this, and as an integral part of it, he built up an outstanding library of ornithology and zoological travel and research. Very little of importance is missing from its catalogue and it is a joy to the bibliophile as well as to the working naturalist.

Fortunately Fleming had the means of carrying out his ambitious plans without the distractions and handicaps of an active business or commercial life. As wealth goes, he was far from the millionaire class, but with his appreciation of the essentials and careful, discriminating management, he was able to accomplish a better, rounder, result than many have done with much ampler resources. He held a particular niche in Canadian ornithology and, directly or indirectly, was a powerful influence in its development. He was

the first Canadian to raise the study from local to a broader interest and to fit Canadian ornithology into the world map. Though fully alive to birds as living organisms, he was not an active field man or preparator of specimens, but he was a great collector of material and information. He had contacts everywhere and little went on in his field or adjoining ones that he did not note and file. Much of value would have been lost to Canadian ornithology but for his keen initiative.

In all this was no spirit of private hoarding but that for the public good, that Canada might be equipped with the adequate working tools of his profession. His collection and library shelves were open to any qualified inquirer, his advice was always freely given and the whole was, from the first, planned to be dedicated to the public service. It was finally deposited without strings or restricting conditions in the Royal Ontario Museum of Zoology in his native city, province and country, where it will remain as a monument to his memory and as a welcome assistance to future working naturalists.

Fleming was not a voluminous writer, except perhaps through correspondence by which he kept in contact with serious ornithologists at home and abroad and exerted his greatest influence. There are no books from his pen and few formal brochures, but he was meticulous in placing important items and data as he unearthed them in the permanent record of print and his bibliography runs to some eighty-four titles from 1890 to 1940. He did not go in for fine writing but always expressed himself clearly and with exacting accuracy. Altogether James Henry Fleming made a name in Canadian ornithology that will increase instead of decrease with time.

A DISTINCTIVE NEW VARIETY OF ORCHIS ROTUNDIFOLIA FROM CANADA ORCHIS ROTUNDIFOLIA BANKS N.VAR. LINEATA

By HENRY MOUSLEY

MANY MOONS have waned since that memorable day, the 24th of June, 1920[1], when for the first time I beheld a few spikes of these tiny opalled gems along the borders of an old logging road. This was in the centre of an extensive swamp near Beebe, a village about fifteen miles southeast of Hatley, Que., in the Eastern Townships. The plants, owing possibly to an idea prevalent at the time when they were first named that round leaves predominated (quite as many in fact more have oval ones), were christened the Small Round-leaved Orchis (*Orchis rotundifolia* Banks). Here in Canada and the United States the genus Orchis, is poorly represented, there being only three species as against twenty in the old country, but as an offset to this we are rich in species of Habenaria, there being no less than thirty-two to a solitary one in the old country. The above swamp later on turned out to be a veritable botanist's El Dorado, no less than eighteen species of orchids besides other interesting plants being found there. The floor was carpeted with a thick cushion of damp sphagnum moss, amongst which grew in the greatest profusion such lovely things as Arethusa (*Arethusa bulbosa*), Pogonia (*Pogonia ophioglossoides*), Calopogon in varying shades of magenta (*Calopogon pulchellus*), topped with wonderful spikes of the Tall White Orchis (*Habenaria dilatata*) and its var. *media*. In addition to all this galaxy of beauty, many uncommon birds could be seen flitting through the firs and spruces, Eastern Golden-crowned Kinglets (*Regulus* s. *satrapa*), Brown Creepers (*Certhia familiaris americana*), Olive-sided Flycatchers (*Nuttallornis mesoleucus*), Northern Parulas (*Compsothlypis americana pusilla*) and other interesting warblers.

But to return to the subject in hand, seldom since that day in June, 1920, have I had the pleasure of gazing upon this little orchid, whose home like that of Calypso (*Calypso bulbosa*, or, as it once was, *C. borealis*, a far more appropriate name in every way), is surely boreal, Canada being especially fortunate in having two such perfect little gems within its borders. In the northern United States and southern Canada it is rare, and the same thing may be said of it here at Montreal, only one station being known to me and that forty miles away, but in the Gaspé Peninsula, Alberta, Saskatchewan, British Columbia, and further north, it may be said to abound in places.

1. Can. Field-Nat., vol. 34, No. 9, Dec., 1920.

From an examination of 250 plants in the National Herbarium at Ottawa from all over Canada, I should say that Alberta and Saskatchewan rank high as its principal home. At all events, the general height of the plants, spread of the spikes of flowers, size and general rotundity of the leaves, are above the average of those from other localities. Some of the specimens I measured exceeded the dimensions given in either Gray's Manual (7th, ed.) or Morris and Eames' *Our Wild Orchids,* a few ranging from 25 - 35 cm. in height, real giants, with leaves as much as 9 x 6 cm., and one spike of flowers 7 cm. in length. Plants from Churchill, the Yukon, Alaska, and the North West Territories, are either very small, or about normal average size. Out of the above 250 plants only 25, or about 1/10th, could be said to have truly orbicular leaves. Early in 1940, Mr. A. E. Porsild, Botanist in charge of the National Herbarium, Ottawa, Ont., drew my attention to an interesting variety of *Orchis rotundifolia,* a photograph of which he had received from Mr. W. C. McCalla of Calgary, Alberta, who had found the plants in damp mossy woods above Elkwater Lake, Cypress Hills, Alberta, on June 27, 1932. Later on, the photo was submitted to various authorities at Harvard, Mass., none of whom, however, had seen or heard of the variety before. Since then, owing to pressure of work, Mr. Porsild has had no time to go further into the matter, and has now asked me to name and describe this interesting variety.

When submitting the photograph to Mr. Porsild, on April 4, 1939, Mr. McCalla regretted that he could find no specimens of the variety at the moment among his duplicates. Later on, however, some were discovered in November of the same year, the following being an extract from the letter accompanying them: "The barred* form is not common here. We saw hundreds of the usual spotted type and not more than seven or eight barred (*sic*) plants. These were scattered about over a considerable area, but four of them were collected on an area of perhaps fifty square yards. Colour much the same as in the spotted ones, but usually (or always) deeper. The bars are a very rich deep purple. I am pleased to present to the National Herbarium five of these plants (No. 3843a), retaining two for my own collection." In all of these plants the spots are run together forming very rich deep purple stripes, as depicted in the beautiful photograph taken by Mr. McCalla on the spot, and herewith reproduced opposite p. 78. For this plant I am proposing:

Orchis rotundifolia Banks var. **lineata,** var. nov. *A planta typica differta labio non maculato sed lineato cum duobus lineis latis obscuris-purpureis.*

This striking variety differs from the species by having two broad, dark purplish stripes on the lip instead of spots. Damp mossy woods above Elkwater Lake, Cypress Hills, Alberta, June 27, 1932, W. C. McCalla, No. 3843-A. Known only from the type locality. Type in the National Herbarium of Canada, isotype in Mr. McCalla's private herbarium. I might add that the five examples presented to the museum by Mr. McCalla all have oblong leaves, similar to those in the plate, the average size being 6 x 3.15 cm., and the height of the plants 18.25 cm. It is hoped that Mr. McCalla (who was unable to visit the spot in 1940) may in the near future be able to secure live material, with a view of determining whether the variety is a mutant or not.

In conclusion, the finding of this very distinctive variety forms another interesting addition to the flora of the Dominion, especially since Mr. McCalla informs me in a recent letter that he has known *O. rotundifolia* since 1899, but had never before seen the lip striped. He also mentions having found two uncommon orchids in these same woods, the Northern Twayblade (*Listera borealis*), and Franklin's Lady Slipper (*Cypripedium passerinum*), the latter very near the American boundary, which is especially interesting since apparently it is unrecorded in the United States.

In 1922[2] I planted five roots of *C. passerinum* at Hatley, Que. (where I was living at the time), which I had received from near Banff, Alberta. Three of these bloomed late in June of the following year, but all unfortunately have since petered out[3], the usual fate attending most experiments in the transplanting of wild orchids.

Finally, my best thanks are due and herewith tendered to Mr. Porsild for his help in the preparation of this paper.

*Obviously a "lapsus calami" on the part of Mr. McCalla since the striking markings of the lip are longitudinal and not transverse.

2. Can. Field-Nat., vol. 38, Apl., 1924.
3. Can. Field-Nat., vol. 40, Nov., 1926.

The illustrations in this number of *The Canadian Field-Naturalist* appear through the kind generosity of Mr. Henry Mousley and Mr. P. A. Taverner, to whom we express our thanks and appreciation.—EDITOR.

A RELIC FLORA ON SAND DUNES FROM THE CHAMPLAIN SEA IN THE OTTAWA VALLEY

By A. E. PORSILD
National Museum of Canada

DURING the summer of 1939 the writer had occasion to visit Constance Bay on the Ottawa River, just within the 30-mile radius of the City of Ottawa, that to local naturalists arbitrarily constitutes the boundary of the Ottawa District. Two brief visits during the latter part of June and a still shorter one, made in the middle of October, contributed not only some unexpected "discoveries" but added about one dozen species to the manuscript list of plants of the district, recorded or otherwise, which is maintained in the National Herbarium of Canada, thus showing that the "possibilities" of the district are still far from exhausted.

The writer's interest was first roused when Mr. Clyde Patch of the National Museum brought to him specimens from Constance Bay of *Hudsonia tomentosa* and *Lithospermum croceum*. The former was then "new" to the district while the latter had been collected here a number of times (Senn, 1938).

A scouting trip to Constance Bay was made on June 24, in the company of Mr. Patch. Both species were soon "rediscovered" along the narrow, sandy road which serves the cottages along the Ottawa, and a side trip inland at once proved that the hills south of the river, the "Sand Hills" of the topographical map, (Arnprior Sheet) were well worth further exploration. The writer, therefore, returned on the following day and spent a most fruitful afternoon.

The Sand Hills occupy the centre and eastern half of a peninsula two miles long and a mile wide, which separates the narrow Buckham Bay from Constance Bay and the Ottawa River (see also Senn, l.c.). When the river stood slightly higher these hills formed an island separated from the mainland by a narrow channel, the remains of which is Buckham Bay. The north and west shore of the peninsula is low and marshy and subject to inundation during spring floods while the southern and eastern part rises to heights of about 225 feet above the river.

Geologically speaking, the Sand Hills, no doubt, are old dunes and were probably formed during the later stages of the Champlain Sea. Similar formations are found in a number of places on the upper Ottawa. In a letter dated October 19, 1939, Dr. A. W. Johnston, formerly of the Geological Survey of Canada, kindly supplied the following notes:

> "In considering the question of origin of the flora (of the Sand Hills) it is important to bear in mind what has happened geologically in the area since the retreat of the last ice sheet from the area some fifteen or twenty thousand years ago. When the ice melted back to the north of the Ottawa Valley, the sea entered because the land was depressed. The upper limit of marine submergence was about 700 feet at Kingsmere and gradually decreased to the south at the rate of about four feet per mile, that is, the land has been uplifted unevenly. During the uplift of the land, or recession of the sea or during a pause in the uplift, the sea rose on the land for a time. This is shown by a depositional break or disconformity in the marine sediments. The area probably 'fell' to about 250 feet and 'rose' to about 400 feet at points along the Ottawa. The isobases of uplift run nearly east and west."
>
> Dr. Johnston further states: "At many places in eastern Ontario there are old dunes which do not seem to have been live dunes (until very recently when the forest cover has been removed) since the time when they were first formed and became clothed with vegetation after the retreat of the Champlain sea. This is shown by the absence, so far as my observations go, of buried soil zones in the dunes. Such zones would have been present if there had been alternate dry and wet periods sufficiently marked to cause destruction and regrowth of the vegetation."

The surface of the Sand Hills back of Constance Bay everywhere shows the characteristic topography of dunes, in marked contrast with the alluvial sands of the low ground now bordering the river. The absence of buried soil or of stratification was noted in some places where recent road construction has cut through a spur of the Sand Hills. Here also a certain amount of drifting of sand was in evidence.

The higher parts of the peninsula at one time were covered by a stand of jack pine but logging operations and successive fires have destroyed most of the original forest cover of which now but charred stumps remain.

The soil everywhere consists of fine sand which, judging from the large number of calciphilous species of plants concentrated in the area, must be decidedly calcareous. The surface soil on level ground, but particularly on the ridges, through leaching has become acid as shown by the presence in such places of oxylophytes. But even here the soil at a depth of 18 inches shows little evidence of leaching. Most of the calciphilous species are found in the bottom of the depressions. No podzolized soil, nor traces of hardpan was observed anywhere.

With such a mixture of acid and calcareous soil it is not surprising that the local flora should exhibit a mixture of oxylophytes and calcicoles. But harder to account for is the fact that the flora contains a large number of species that are either rare or unrecorded from the Ottawa Valley, although nearly all are common, if often localized, on the coastal plain of the New England states and in the Great Lakes region.

Of the 60-odd species of vascular plants noted on the Sand Hills the following 24 species are those that most obviously belong in this group: *Andropogon scoparius, Sorghastrum nutans, Panicum depauperatum* var. *psilophyllum, Cyperus filiculmis* var. *macilentus, Carex heliophila, C. siccata, Polygonella articulata, Silene antirrhina, Anemone riparia, Arabis divaricarpa, Ceanothus americanus, C. ovatus, Helianthemum canadense, Hudsonia tomentosa, Lechea intermedia, Viola adunca, Convolvulus spithamaeus, Lithospermum croceum, Solidago hispida, Aster saggitifolius, Antennaria Brainerdii, Helianthus divaricatus, Artemisia camporum* and *Senecio Balsamitae.*

It should be noted that the above are all more or less psammophilous, and nearly all also calciphilous species. The question therefore is, do these plants grow here because of those particular soil conditions, or, does this element in the local flora constitute a small relic flora localized here since the recession of the Champlain Sea.

The latter history seems probable in view of the postglacial history of the Ottawa Valley which, following the recession of the last ice sheet, was invaded by the sea (Johnston, 1916) and formed a connecting "back door" passage from the Champlain Sea to Lake Algonquin. Peattie (1922) called attention to the presence, in the southern part of the Great Lakes basin, of a large element of Coastal Plain species, enumerating about 90 species and "endemic derivatives." In recent years a number of additional species have been added by various writers and the range of a great many of the species listed by Peattie have been extended to other parts of the Great Lakes basin.

Marie-Victorin (1935), enumerates 51 species of vascular plants from the upper Ottawa Valley for which he postulates postglacial immigration from the Great Lakes.

Griggs (1940) points out that "rarities grow together, certain areas being especially rich in plants not to be found elsewhere for long distances" and also that many rare plants of disrupted range are localized in areas that in very recent time became available for plants, and, where for this reason competition has been less severe.

This is a further step in the direction taken by Wynne-Edwards (1937 and 1939) who has pointed out that at least some arctic-alpine species of disrupted range, that Fernald (1925) considered senescent species occupying refugia that escaped glaciation, are actually species "adopted to localized soils rich in lime or in combinations of magnesia, lime and soda."

THE LOCAL FLORA.

When crossing the peninsula diagonally, from a point near Sand Hill's Light on the Ottawa to Buckham Bay, we first cross a series of low, slightly elevated beaches, separated by low, marshy ground, subject to spring floods. On the higher ground grows scattered jack pine and scrub oak while the lower ground is occupied by a dense tangle of willow and aspen. The ground cover consists chiefly of bracken and poison ivy.

A short distance from the river we leave the flood plain and ascend the Sand Hills. The topography is the characteristic one for large dunes, sculptured into irregular crescent-shaped ridges interspersed with wind-eroded shallow cuts and hollows. Water-eroded valleys are, of course, not seen, nor are there any lakes or ponds. During the winter, snow, no doubt, accumulates in the depressions thus providing moisture during early spring. This, with a certain amount of seepage following heavy summer rains, accounts for the somewhat more mesophytic aspect of the vegetation in the hollows. There remains a few old pines that escaped logging operations and the successive fires, the last of which swept the peninsula about ten years ago. From these trees, or from seed that may have survived the fire, new growth of jack pines is in evidence everywhere. With it is mixed scrubby *Quercus borealis, Salix Bebbiana* and *Populus tremuloides*

and *P. grandidentata.* The ground cover is close everywhere.

On gently sloping ground and in level places *Vaccinium pennsylvanicum, Gaylussacia baccata* with *Myrica asplenifolia, Ceanothus americanus* and *C. ovatus* and *Arctostaphylos Uva-Ursi* form a dense cover. A few herbaceous species are found here but do not form an important part of the cover. The more important ones are *Andropogon scoparius, Sorghastrum nutans, Oryzopsis pungens, Carex siccata, Lycopodium tritachyum, Aster saggitifolius* and *Solidago hispida.*

Here and there, for reasons that may be sought in variation in soil composition, remarkably sharp breaks occur where the above mentioned rather uniform dwarf shrub association is replaced by almost pure stands of *Pteridium* and *Myrica.* In other places huckleberries grow almost to the exclusion of other species while in a few places were seen low thickets of *Salix humilis, Cornus stolonifera* with a ground cover of *Prunus susquehaena.*

Some of the most interesting finds were made on the most exposed ridges, where the effect of the fire perhaps had been most pronounced, and where, perhaps due to a slight drifting of sand, competition for space was less severe. (See also Griggs, 1940).

Here were found *Antennaria neodioica* and *A. Brainerdii* along with *Lycopodium tristachyum* and small, dense tufts of the pale blue *Viola adunca* and the heath-like dwarf shrub *Hudsonia tomentosa,* further *Comandra Richardsiana, Arabis divaricarpa, Silene antirrhina,* the moss-like *Selaginella rupestris,* and, in a patch of *Arctostaphylos Uva-Ursi,* among clumps of grey cladonias, grew masses of the tiny, delicate, pink-flowered *Polygonella articulata* and near it *Cyperus filiculmis* var. *macilentus.*

A somewhat more diversified flora was found in the depressions. Towards the end of June these hollows exhibit a gay mass of colour and, were it not for the omnipresent vines of poison ivy, would have made as delightful a spot for a picnic as one would find in the district.

Most conspicuous at this time of the season were showy, large-flowered spikes of deep-golden *Lithospermum croceum* and the delicate, somewhat paler vernal flowers of *Helianthemum canadensis.* Here and there, often half hidden under scrub oaks, were single plants of *Lilium philadelphicum* and low bushes of the delicate, wild, northern *Rosa acicularis.*

Less conspicuous and often in shaded places near the bottom were seen an occasional clump of *Epigaea repens, Anemone riparia, Lechea intermedia, Botrychium multifidum, Pyrola elliptica, Gaultheria procumbens* and many others.

The upper rim of the often amphitheatre-like hollows in most places are covered either by *Pteridium latiusculum* and *Myrica asplenifolia* or by a loose turf formed chiefly by *Carex siccata* and *C. heliophila.*

The steep slope facing Buckham Bay apparently escaped the last major fire. Here is found a more mesophytic mixed forest of aspens, poplars with a few jack pine, yellow birch and oaks. The ground cover here is the usual one in the district for such forests and need not be considered here.

THE CATALOGUE.

In the following annotated list of the flowering plants and ferns seen or collected on the Sand Hills the writer does not claim to have recorded all species actually now occurring there. He is aware, for example, that he missed certain grasses and sedges that at the time of his visit, in June, were still too immature, and that, at the time of his last visit, in October, were past.

In the list are not included marsh species limited to the river bank or flood plain bordering the Ottawa or Buckham Bay, nor some mesophytic woodland species limited to the mixed, desiduous forest growing on the steep slope facing the foot of Buckham Bay.

Following the destruction of the original forest cover the present flora of the Sand Hills is in an interesting successional stage; for this reason, and because of the diversified soil conditions it has been thought worth while, nevertheless, to record the present list, incomplete though it may perhaps be.

Botrychium multifidum (Gmel.) Rupr. ssp. **silaifolium** (Presl.) Clausen. Very scarce; seen but a few times in moist sandy hollows. Common in the district. General Canadian range from Prince Edward Island to the Great Lakes region.

Pteridium latiusculum (Desv.) Hieron. — Very common. Widely distributed species.

Lycopodium flabelliforme (Fern.) Blanchard. —Common in dry aspen woods towards Buckham Bay but rare elsewhere. General Canadian range from Prince Edward Island to the Great Lakes region.

L. tristachyum Pursh. — Fairly common on

semi-barren, sandy ridges. In the district otherwise known from Mer Bleue. General Canadian range from the Maritimes to the Great Lakes region and northern Saskatchewan (Athabasca L.)

Selaginella rupestris Spring.—Sparingly on dry, sandy ridges. Common in the district in sterile places. Widely distributed, at least as far as the Great Lakes.

Equisetum hyemale L. var **affine** (Engelm.) A. A. Eaton.—Here and there in moist depressions. Widely distributed in the southern portion of the Dominion.

Pinus Banksiana Lamb.—A few scattered old trees, but abundance of seedlings and young trees. Common in suitable places in the district. General distribution from the Maritimes to the Mackenzie.

Andropogon scoparius Michx. — Here and there on dry ridges and slopes. Known in the district from Billings Bridge, Chelsea and Wakefield. Known from New Brunswick, along the St. Lawrence, Lake Ontario, Erie, Huron and Superior and also from Saskatchewan and Alberta.

Sorghastrum nutans (L.) Nash. — Here and there on dry slopes and ridges. In the district known from Billings Bridge, Governor's Bay, Chelsea and Wakefield. General distribution: Maine to Manitoba, chiefly along the Great Lakes.

Panicum depauperatum Muhl. var. **psilophyllum** Fern.*—Common in open places. Not previously recorded from the Ottawa District.

Oryzopsis pungens (Torr.) Hitchc. — Common in open woods. Widely distributed species.

Poa pratensis L. var. — A curious *Poa* is not uncommon in dry heath and in sandy places where it forms small, loose tufts of a few culms. The leaves are narrow and conduplicate and much shorter than the slender, smooth and somewhat shiny culm. The panicle is rather narrow and the whole plant superficially resembles certain forms of *Festuca ovina*. Professor Fernald suggested to the writer that it might be the little known var. *angustifolia* (L.) Sm. (*P. angustifolia* L.) of Europe.

Cyperus filiculmis Vahl var. **macilentus** Fern. —Sparingly in a wagon trail on a sandy ridge. New to the Ottawa District; in Canada otherwise known from sandy places along the St. Lawrence at Lake St. Pierre, on the upper Ottawa River and on Lake Ontario.

Carex heliophila Mack.—Very common on open, sandy slopes. New to the Ottawa District; in Canada known from Manitoba to British Columbia.

C. siccata Mack.—Very common on open, sandy slopes with the preceding. New to the Ottawa District; elsewhere in Canada known from shores of Lake Ontario and Great Lakes west to British Columbia and Yukon.

Smilacina stellata (L.) Desf.—Sparingly on sandy slopes and in open aspen woods. Widely distributed in suitable places from Newfoundland to British Columbia.

Majanthemum canadense Desf. — Common in open aspen woods; rare elsewhere. Widely distributed from Newfoundland west to Algonquin Park. West of Georgian Bay the species is replaced by its var. *interius* Fern.

Lilium philadelphicum L.—Here and there in thickets. Known also from a number of other places in the district; west to British Columbia and north to James Bay.

Salix Bebbiana Sarg.—Forming clumps and open thickets. A widely distributed species.

S. humilis Marsh. — Common . Widely distributed species from Newfoundland to Manitoba, but in Ontario chiefly in the Lake Ontario region.

Populus grandidentata Michx.—Fairly common throughout. Widely distributed in calcareous soils from Nova Scotia to the Great Lakes.

P. tremuloides Michx. — Fairly common throughout. Widely distributed from Newfoundland to British Columbia.

Myrica asplenifolia L.—Very common on dry ridges and slopes. Common in dry, sterile places from Prince Edward Island to Ontario west to Algonquin Park; according to Gray's Manual west to Saskatchewan.

Quercus borealis Michx.—Common; forming thickets on dry slopes and in the hollows. Widely distributed on poor soil from Nova Scotia west to Ontario (Algonquin Park).

Comandra Richardsiana Fern.—Common on dry ridges and in open pine woods. In the district otherwise known from Rockcliffe and Blueberry Point, Aylmer. General distribution: Prince Edward Island west to British Columbia.

*The writer is indebted to Professor M. L. Fernald, Gray Herbarium, Harvard University, for the determination of Panicum depauperatum var. psilophyllum, Rubus setosus and Antennaria Brainerdii.

Polygonella articulata (L.) Meisn.—Common in one place, on a dry, sandy ridge. Previously recorded from the Ottawa District, probably from the identical spot, by H. Groh (1926). In Canada otherwise known from the upper Ottawa Valley (Petawawa Ont., Waltham, Que., the Algoma District and Pt. aux Pins, Lake Superior, Ont.) Otherwise known from New England states and from the Great Lakes region. Our specimens were flowering on October 9th.

Silene antirrhina L. — Sparingly, in open sandy places. Known in the district from King's Mountain and Aylmer. In Canada known from sandy places, chiefly in southern Ontario, the Great Lake region west to Lake Winnipeg and Lake Athabasca.

Anemone riparia Fern.—Here and there in the depressions. Known in the district from limestone cliffs along the Ottawa; in Canada otherwise known from New Brunswick, Quebec, Southern Ontario to James Bay.

Aquilegia brevistyla Hook.—The plant which is hesitatingly referred here was collected in October, in a shallow ravine. This record, if verified by better material, constitutes a very considerable range extension since this species was previously known from western Ontario (Severn River) to British Columbia and north to the Mackenzie.

Arabis divaricarpa Nels.—Sparingly in open, sandy places. Previously known from the district from Rockcliffe and Hull. In Canada known from Quebec along the St. Lawrence through the Great Lakes region to British Columbia and Yukon.

Rubus hispidus L.—Common in open, sandy places. Known from a number of places in the district; in Canada otherwise known from Nova Scotia to south-western Ontario and the north shore of Lake Superior.

R. setosus Bigel.—Apparently common in thickets; new to the flora of the district.

Fragaria sp. —A small-leaved, strawberry plant was collected in October; it was common in one or two hollows.

Rosa acicularis Lindl.—Common in open thickets. Previously known in the district from points along the Ottawa; otherwise known in Canada from Northern Ontario and Quebec west across the continent to British Columbia.

Prunus pennsylvanica L.—Common in thickets and open woods. A widely distributed species.

P. susquehanae Willd. (See Fernald, in Rhodora 25: 69-74 (1923)).—Common in depressions. This appears to be the sand cherry common in sandy and rocky places along the upper Ottawa. The branches are erect and the leaves, when mature are large and lanceolate. The fruit is dry and scarcely edible.

Rhus typhina L.—Common near the river; a few specimens seen in a ravine on the Sand Hills. Common in sandy, calcareous places throughout the district; in Canada otherwise known from Prince Edward Island west to Lake Huron

R. Toxicodendron L.—Common everywhere, particularly in moist thickets and depressions, but not wanting even in blueberry patches on the hills. A widely distributed species.

Ceanothus americanus L.—Common in open thickets, especially towards Buckham Bay. In the Ottawa district previously known from Rockcliffe and Aylmer; in Canada otherwise known from the lower Ottawa and Lake Ontario.

C. ovatus Desf.—Very common in open thickets and on sandy ridges. Not previously recorded from the Ottawa District. In Canada known from the St. Lawrence Valley, through Lake Ontario and the Great Lakes; also from the upper Ottawa Valley. According to Gray's Manual, ed. 7, west to Manitoba.

Helianthemum canadense (L.) Michx.—Here and there in open places. New to the flora of the Ottawa District. In Canada previously known from Lake Ontario, Lake Erie west to Lake Superior (Lake of the Woods).

Hudsonia tomentosa Nutt.—Here and there on the most dry and barren sand ridges. Not previously known from the Ottawa District. In Canada in sandy places from Nova Scotia along the St. Lawrence through the Great Lakes to Lake Athabasca, Saskatchewan. Also known from Lake St. John and from the upper Ottawa Valley (Bonnechere River, Chalk River).

Lechea intermedia Leggett. — Sparingly, in moist depressions. Not previously known from the Ottawa District. In Canada of essentially the same distribution as the preceding.

Viola adunca Sm.—(See Rhodora 15: 106-111 (1913)). Here and there on sandy ridges and in open places. Not previously known from the Ottawa District. According to *Brainerd,* l.c., from Gaspé, New Brunswick, southern Ontario, Michigan. (Ille Royale, Lake Superior) and North Dakota.

Oenothera sp.—Sterile rosettes of a large-leaved *Oenothera* were collected in October.

Aralia hispida Vent.—Common throughout. In Canada known from the Maritimes west to Lake Winnipeg.

Cornus stolonifera Michx. — Common along the river; on the Sand Hills seen in one or two places. Widely distributed species.

Chimaphila umbellata (L.) Nutt.—Common in rich aspen woods near Buckham Bay; rare elsewhere. Widely distributed species.

Pyrola elliptica Nutt.—Rare, in rich aspen woods and in moist depressions. Widely distributed species.

Epigaea repens L.—Apparently rare; seen but once or twice in moist depressions. In Canada known from the Maritimes to Saskatchewan.

Gaultheria procumbens L.—Common in open aspen woods and in moist depressions. In Canada from the Maritimes to Manitoba.

Arctostaphylos Uva-Ursi (L.) Spreng.—Common on sandy slopes and ridges. In the Ottawa district known from Rockcliffe Park and from the lower Gatineau River. In Canada known from the Gulf of St. Lawrence to British Columbia but east of the Great Lakes the distribution is very spotty.

Gaylussacia baccata (Wang.) K. Koch.—Common, especially on level ground and on open, wooded slopes. Common in eastern Canada, west to the Great Lakes.

Vaccinium pennsylvanicum Lam.—Very common. Common in Canada, west to Lake Superior.

V. pennsylvanicum Lam. var **nigrum** Wood.—This black-fruited blueberry is fairly common on the Sand Hills and in similar places along the upper Ottawa.

Convolvulus spithamaeus L. — Common in open grassy places. In the Ottawa District previously known from one station (La Peche Lake, Quebec). Here and there in sandy places across Canada, from the Gulf of St. Lawrence to the foothills of western Alberta. Perhaps most common on the upper Ottawa and in the Great Lakes region.

Lithospermum croceum Fern. (see Rhodora, 37: 329-31 (1935)).—Common in grassy places and in open, sunny thickets. Fernald (l.c.) gives the following distribution: "Sands, gravels and sandy woods, thickets and bluffs near the Great Lakes from western New York and Ontario westward, thence to Montana, South Dakota, Nebraska and Kansas." The Canadian distribution has recently been given by Senn (1938).

Diervilla Lonicera Mill.—Common on open slopes and in thickets. In Canada common from the Maritimes west to Lake Superior.

Solidago hispida Muhl.—Common in open, sunny thickets. In Canada known from calcareous soils from Quebec to Saskatchewan.

Aster saggitifolius Wedem.—Here and there in open thickets. New to the flora of the Ottawa District, but previously known from southern Ontario.

Antennaria Brainerdii Fern.—Rare on sandy ridges. The specimens are over mature, with empty receptacles. The species, to my knowledge, has not previously been recorded from Canada, although there is, in the National Herbarium, a sheet of sterile leaf rosettes thus annotated by Professor Fernald (Algonquin Park, on dry rocks, Catfish Lake, July 23, 1900, *John Macoun*, No. 21, 855).

A. neodioica Greene.—Common on dry, sandy slopes. In Canada known from Gaspé west to Lake Superior.

Helianthus divaricatus L.—Here and there in open, sunny thickets. In Canada known chiefly from the upper Ottawa Valley and from the Great Lakes region west to Lake Winnipeg.

Artemisia camporum Rydb.—Here and there in sandy places. New to the flora of the Ottawa District. In Canada known chiefly from western Ontario and from the Great Lakes region.

Senecio Balsamitae Muhl.—Here and there on open, sunny slopes. In Canada known from the Gulf of St. Lawrence and the Great Lakes region west to British Columbia.

Hieracium florentinum All.—Common along a sandy road.

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WATER TRAPS CAPTURE THE PIGMY SHREW (Microsorex hoyi) IN ABUNDANCE

By LESLIE A. PRINCE

ANTHONY (1928) remarking on the numbers of pigmy shrews states, "Pigmy shrews seem to be rare and never have been found in even moderate abundance." However, during the summer of 1939 at Lake Attawapiskat, Patricia portion of Kenora district, Ontario, the writer collected sixty specimens of the pigmy shrew, over a period of seventy-six days' trapping. As the pigmy shrew has previously been considered a rare shrew in North America, this collecting of an extensive series of this species and the method of trapping adopted seem worthy of note.

The habitat of this species in the Lake Attawapiskat region appeared to be confined to two distinct types: a dry, high grass clearing, bordering second growth alder-poplar-birch woods and the alder-birch-poplar-dogwood border of Lake Attawapiskat. In both habitats the ground cover was very dry and quite open with little litter or brush. Only one specimen was taken in habitat other than the two described. This specimen was trapped in a very wet sphagnum bog, bordering a black spruce woods.

Fifty-eight of the sixty specimens were taken in water traps and the remaining two specimens, in mouse traps. This significant and important fact was also noted by Clarke (1935), who collected a series of ten pigmy shrews at Pancake Bay, Ontario. All of these specimens were taken in water traps, although mouse traps were used extensively over the entire area worked. Similar results were noted at Favourable Lake, Ontario, in 1938, where the writer collected twelve pigmy shrews, ten of which were taken in water traps.

It is thought that, as the systematic use of the water trap by collectors has been so limited, a brief description of the type of trap used by the writer is necessary. Any type of can or bucket may be used. There appears to be no limit as to the size of bucket which can be used, but experience suggests that best results are obtained by using cans which are not smaller than seven or eight inches in diameter and approximately eight inches deep. An exact description of the type of water traps with which the writer has had the greatest success is as follows: a nesting series of galvanized tin sap buckets, twelve inches deep, with a diameter of eight inches at the mouth and five inches at the bottom. This type of bucket is very practical as it may be handled and transported easily.

This bucket, three-quarters filled with water, was placed in a hole with the top rim slightly below the surface of the ground. The sides of the bucket were tightly packed in with earth and only the open top of the trap was exposed. While performing these experiments, it was questionable how the mammals were actually captured,—whether they stumbled blindly into the trap or whether they jumped in to investigate and thus were drowned. During periods of heavy rainfall the level of the water in the traps may rise sufficiently to allow the animals to reach the top and escape, so that there is only one requirement after setting the trap: the water in the trap must be kept at the right level.

Such a type of trap has many advantages. No bait is required. The specimens taken in water traps are free from the attack of insects and other animals. No skulls or skeletons are damaged, this being a very important factor in collecting small mammals. Specimens are more easily prepared as the cold water in the bucket tends to prevent decomposition.

Therefore, it seems that the apparent rarity of the pigmy shrew has resulted from the previously-adopted method of trapping and the importance and value of using the water trap in general and systematic small mammal collecting should be stressed.

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A STUDY OF THE FLORA OF WELLINGTON COUNTY, ONTARIO

By JOHN J. STROUD

(*Continued from page 62*)

ARACEAE

Arisaema triphyllum (L.) Schott.
Calla palustris L.
Symplocarpus foetidus (L.) Nutt.
Acorus Calamus L.

LEMNACEAE

Lemna minor L.

PONTEDERIACEAE

Pontederia cordata L.

JUNCACEAE

Juncus bufonius L.
J. macer S. F. Gray. (*J. tenuis* Willd.)
J. balticus Willd., var. *littoralis* Engelm.
J. effusus L.
J. nodosus L.
J. acuminatus Michx.
J. alpinus Vill., var. *rariflorus* Hartm. (var. *insignis* Fries.)
J. articulatus L.
Luzula saltuensis Fernald.

LILIACEAE

Tofieldia glutinosa (Michx.) Pers.
Zygadenus elegans Pursh. (*Z. chloranthus* Richards.)
Uvularia grandiflora Sm.
Allium tricoccum Ait.
A. Schoenoprasum L., var. *sibiricum* (L.) Hartm.
A. cernuum Roth.
**Hemerocallis fulva* L.
Lilium philadelphicum L.
L. philadelphicum L., var. *andinum* (Nutt.) Ker.
L. canadense L.
**L. tigrinum* Ker.
Erythronium americanum Ker.
**Ornithogalum umbellatum* L.
**Muscari botryoides* (L.) Mill.
**Asparagus officinalis* L.
Clintonia borealis (Ait.) Raf.
Smilacina racemosa (L.) Desf.
S. stellata (L.) Desf.
S. trifolia (L.) Desf.
Maianthemum canadense Desf.
M. canadense Desf., var. *interius* Fernald.
Streptopus roseus Michx.
Polygonatum pubescens (Willd.) Pursh. (*P. biflorum* (Walt.) Ell.)
P. commutatum (R. & S.) Dietr.
Medeola virginiana L.
Trillium erectum L.
T. grandiflorum (Michx.) Salisb.
Smilax herbacea L.
S. hispida Muhl.

IRIDACEAE

Iris versicolor L.
I. pumila L.
Sisyrinchium angustifolium Mill.

ORCHIDACEAE

†*Cypripedium arietinum* R. Br.
C. parviflorum Salisb.
C. parviflorum Salisb., var. *pubescens* (Willd.) Knight.
C. reginae Walt. (*C. hirsutum* Mill.)
C. acaule Ait.
Orchis rotundifolia Banks.
O. spectabilis L.
Habenaria viridis (L.) R. Br., var. *bracteata* (Muhl.) A. Gray. (*H. bracteata* (Willd.) R. Br.)
H. hyperborea (L.) R. Br.
H. dilatata (Pursh) Gray.
H. clavellata (Michx.) Spreng.
H. orbiculata (Pursh) Torr.
H. lacera (Michx.) R. Br.
H. psycodes (L.) Sw.
Pogonia ophioglossoides (L.) Ker.
Calopogon pulchellus (Sw.) R. Br.
Arethusa bulbosa L.
Spiranthes cernua (L.) Richard.
S. Romanzoffiana Cham.
Goodyera repens (L.) R. Br., var. *ophioides* Fernald. (*Epipactis repens* (L.) Crantz., var. *ophioides* (Fernald) A. A. Eaton.)
G. pubescens (Willd.) R. Br. (*Epipactis pubescens* (Willd.) A. A. Eaton.)
Corallorhiza trifida Chatelain.
C. striata Lindl.
C. maculata Raf.
Microstylis monophyllos (L.) Lindl.
Liparis Loeselii (L.) Richard.
Calypso bulbosa (L.) Oakes.

SALICACEAE

Salix amygdaloides Anders.
S. lucida Muhl.

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†This rare orchid seems to have been missed by earlier collectors as no mention of it was found in an article by E. J. Colgate, The Orchidaceae of Wellington County, Ontario Natural Science Bulletin: 1: 32, 1905. Nor does Wm. Herriot mention it in his article in the same publication 5: 26-30, 1909, dealing with the Galt region. A considerable number were found in flower near Puslinch.

*S. *fragilis* L.
S. *cordata* Muhl.
S. *discolor* Muhl.
S. *petiolaris* Sm.
S. *humilis* Marsh.
**Populus alba* L.
P. *tremuloides* Michx.
P. *grandidentata* Michx.
P. *tacamahacca* Mill. (*P. balsamifera* L.)
**P. candicans* Ait.
P. *balsamifera* L. (*P. deltoides* Marsh.)
**P. nigra* L., var. *italica* Du Roi.

MYRICACEAE

Myrica Gale L.

JUGLANDACEAE

Juglans cinerea L.
†*J. nigra* L.
Carya ovata (Mill.) K. Koch
C. cordiformis (Wang.) K. Koch

BETULACEAE

Corylus cornuta Marsh. (*C. rostrata* Ait.)
Ostrya virginiana (Mill.) K. Koch
Carpinus caroliniana Walt.
Betula lutea Michx. f.
B. populifolia Marsh.
**B. pendula* Roth.
**B. alba* L.
B. papyrifera Marsh. (*B. alba* L. var. *papyrifera* (Marsh.) Spach)
Alnus crispa (Ait.) Pursh.
A. incana (L.) Moench.

FAGACEAE

Fagus grandifolia Ehrh.
Castanea dentata (Marsh.) Borkh.
Quercus macrocarpa Michx.
Q. rubra L.

URTICACEAE

Ulmus fulva Michx.
**U. campestris* L.
U. americana L.
U. racemosa Thomas
Celtis occidentalis L.
**Cannabis sativa* L.
Humulus Lupulus L.
*Morus *alba* L.
Urtica gracilis Ait.
Laportea canadensis (L.) Gaud.
Pilea pumila (L.) Gray.
Boehmeria cylindrica (L.) Sw.

SANTALACEAE

Comandra umbellata (L.) Nutt.
C. Richardsiana Fernald.

LORANTHACEAE

Arceuthobium pusillum Peck.

ARISTOLOCHIACEAE

Asarum canadense L.
**Aristolochia macrophylla* Lam.
**A. Clematitis* L.

POLYGONACEAE

**Rumex crispus* L.
**R. conglomeratus* Murr.
**R. obtusifolius* L.
**R. Acetosella* L.
Polygonum aviculare L.
P. *aviculare* L., var. *angustissimum* Meisn.
P. *erectum* L.
P. *lapathifolium* L.
P. *amphibium* L.
P. *amphibium* L., forma *Hartwrightii* (Gray) Blake. (var. *Hartwrightii* (Gray) Bissell.)
P. *coccineum* Muhl. (*P. Muhlenbergii* (Meisn.) Wats.)
P. *pennsylvanicum* L.
P. *Hydropiper* L.
P. *robustius* (Small) Fernald. (*P. acre* HBK.)
**P. Persicaria* L.
P. *hydropiperoides* Michx.
**P. Convolvulus* L.
P. *scandens* L.
**P. cuspidatum* Sieb & Zucc.
**Fagopyrum esculentum* Moench.

CHENOPODIACEAE

Cycloloma atriplicifolium (Spreng.) Coult.
**Kochia scoparia* (L.) Schrad.
**K. scoparia* (L.) Schrad., var *trichophila* (Schinz. & Thell.) Bailey)
**Chenopodium Botrys* L.
C. *capitatum* (L.) Asch.
**C. Bonus-Henricus* L.
**C. glaucum* L.
C. *hybridum* L.
**C. album* L.
**C. urbicum* L.
Atriplex patula L.
A. *patula* L., var. *hastata* (L.) Gray.
**Monolepis Nuttalliana* (R. & S.) Wats.
**Salsola Kali* L., var. *tenuifolia* G. F. W. Mey.
**Axyris amarantoides* L.

AMARANTHACEAE

**Amaranthus retroflexus* L.
**A. hybridus* L.
**A. paniculatus* L.
A. *graecizans* L.
**A. blitoides* Wats.

†Possibly an introduced tree to this region. According to J. M. Buchan, Notes on the Flora of Hamilton, Canadian Journal, Aug. 1874, 281-304: "This tree does not seem to appear north of the Hamilton Valley."

AIZOACEAE

Mollugo verticillata L.

CARYOPHYLLACEAE

Spergula arvensis L.
Arenaria serpyllifolia L.
Stellaria longifolia Muhl.
S. graminea L.
S. media (L.) Cyrill.
Cerastium arvense L.
C. vulgatum L.
Agrostemma Githago L.
Lychnis coronaria (L.) Desr.
L. chalcedonica L.
L. dioica L.
L. alba Mill.
Silene noctiflora L.
S. latifolia (Mill.) Britten & Rendle.
Saponaria officinalis L.
S. Vaccaria L.
Dianthus deltoides L.
D. Armeria L.

PORTULACACEAE

Claytonia virginica L.
C. caroliniana Michx.
Portulaca oleracea L.

NYMPHAEACEAE

Nymphozanthus advena (Ait.) Fernald. (*Nymphaea advena* Ait.)
Nymphaea odorata Ait. (*Castalia odorata* (Ait.) Woodville & Wood.)

RANUNCULACEAE

Ranunculus Ficaria L.
R. trichophyllus Chaix., var. *typicus* Drew. (*R. aquatilis* L., var. *capillaceus* DC.)
R. delphinifolius Torr.
R. Purshii Richards.
R. sceleratus L.
R. abortivus L.
R. recurvatus Poir.
R. fascicularis Muhl.
R. septentrionalis Poir.
R. hispidus Michx.
R. repens L.
R. pennsylvanicus L. f.
R. bulbosus L.
R. acris L.
Thalictrum dioicum L.
T. revolutum DC.
T. polygamum Muhl.
Anemonella thalictroides (L.) Spach.
Hepatica americana (DC.) Ker. (*H. triloba* Chaix.)
H. acutiloba DC.
Anemone virginiana L.
A. cylindrica Gray.
A. canadensis L.
A. quinquefolia L.
Clematis virginiana L.
C. Viorna L.
Caltha palustris L.
Coptis groenlandica (Oeder) Fernald. (*C. trifolia* (L.) Salisb.)
Aquilegia canadensis L.
A. vulgaris L.
Actaea rubra (Ait.) Willd.
A. alba (L.) Mill.

MENISPERMACEAE

Menispermum canadense L.

BERBERIDACEAE

Podophyllum peltatum L.
Jeffersonia diphylla (L.) Pers. (about 1 mile south of County Line)
Caulophyllum thalictroides (L.) Michx.
Berberis vulgaris L.
B. aquifolium L.

PAPAVERACEAE

Sanguinaria canadensis L.
Chelidonium majus L.
Papaver Rhoeas L.
Argemone mexicana L.

FUMARIACEAE

Adlumia fungosa (Ait.) Greene.
Dicentra Cucullaria (L.) Bernh.
D. canadensis (L.) Bernh.
Corydalis aurea Willd.
Fumaria officinalis L.

CRUCIFERAE

Berteroa incana (L.) DC.
Lobularia maritima (L.) Desv.
Alyssum alyssoides L.
Thlaspi arvense L.
Lepidium virginicum L.
L. densiflorum Schrad. (*L. apetalum* Willd.)
L. sativum L.
L. campestre (L.) R. Br.
L. Draba L.
Capsella Bursa-pastoris (L.) Medic.
Camelina sativa (L.) Crantz.
C. microcarpa Andrz.
Neslia paniculata (L.) Desv.
Cakile edentula (Bigel.) Hook., var. *lacustris* Fernald. (*C. edentula* (Bigel.) Hook.)
Raphanus Raphanistrum L.
R. sativus L.
Brassica alba (L.) Boiss.
B. arvensis (L.) Ktze.
B. juncea (L.) Cosson.
B. nigra (L.) Koch.

Diplotaxis tenuifolia (L.) DC.
Conringia orientalis (L.) Scop.
Sisymbrium officinale (L.) Scop.
S. altissimum L.
S. incisum Engelm.
S. incisum Engelm. var. *filipes* Gray.
S. sophia L.
Hesperis matronalis L.
Erysimum cheiranthoides L.
E. parviflorum Nutt.
Nasturtium Nasturtium-aquaticum (L.) Karst. (*Radicula Nasturtium-aquaticum* (L.) B. & R.)
Roripa sylvestris (L.) Bess. (*Radicula sylvestris* (L.) Druce)
R. palustris (L.) Bess. (*Radicula palustris* (L.) Moench.)
R. palustris (L.) Bess. var. *hispida* (Desv.) Rydb. (*Radicula palustris* (L.) Moench. var. *hispida* (Desv.) Robs.)
Armoracia rusticana Gaertn. (*Radicula Armoracia* (L.) Robinson)
Barbarea vulgaris R. Br.
†*B. vulgaris* R. Br. var. *longisiliquosa* Fernald (*B. stricta* Andrz.)
Dentaria diphylla Michx.
D. laciniata Muhl.
Cardamine bulbosa (Schreb.) BSP.
C. bulbosa (Schreb.) BSP. var. *purpurea* (Torr.) BSP. (*C. Douglassii* (Torr.) Britton)
C. pratensis L.
C. pennsylvanica Muhl.
Arabis glabra (L.) Bernh.
A. hirsuta (L.) Scop.
A. canadensis L.
Lunaria annua L.
Erucastrum gallicum (Willd.) O.E. Sch.

CAPPARIDACEAE

Cleome serrulata Pursh.
C. spinosa L.

SARRACENIACEAE

Sarracenia purpurea L.

DROSERACEAE

Drosera rotundifolia L.

CRASSULACEAE

Penthorum sedoides L.
Sedum acre L.
Sempervivum tectorum L.

SAXIFRAGACEAE

Saxifraga virginiensis Michx.
Mitella diphylla L.
M. nuda L.
Chrysosplenium americanum Schwein.
Parnassia americana Muhl. (*P. caroliniana* Michx.)
Philadelphus grandiflorus Willd.
Ribes Cynosbati L.
R. hirtellum Michx. (*R. oxyacanthoides* L.)
R. americanum Mill. (*R. floridum* L'Her.)
R. nigrum L.
R. glandulosum Grauer. (*R. prostratum* L'Her.)
R. sativum (Reichenb.) Syme. (*R. vulgare* Lam.)
R. triste Pall.
R. triste Pall. var. *albinervum* (Michx.) Fernald

HAMAMELIDACEAE

Hamamelis virginiana L.

(To be Continued)

† *Barbarea stricta* Andrz. according to Gray's Manual, is considered as *B. orthoceras* Ledeb. by Marie-Victorin, (Flore Laurentienne: 269. 1935). Commenting on *B. vulgaris*, Wiegand and Eames, (Cayuga Flora: 231, 1926) say: "In exposed situations the pods are usually appressed (*B. stricta* of Gray's Manual, not. Andrz., *B. vulgaris* R. Br., var. longisiliquosa Fernald, Rhodora 11: 139, 1909, and of Carion?), but when growing in the shade or in especially damp situations, the pods are commonly much more spreading. (see Jour. Bot. 54: 202, 1916 and 57: 304, 1919)." However my experience has been that B. vulgaris is more commonly found along roadsides and drier situations than the *B. stricta* of Gray, which was found along the banks of the Grand River. My opinion is that it might be regarded as a variety of *B. vulgaris*.

NOTES AND OBSERVATIONS

UNUSUAL NUMBER OF IVORY GULLS (*Pagophila alba*) ALONG THE NORTH SHORE OF THE GULF OF ST. LAWRENCE.—An adult Ivory Gull, killed in December, 1939, near Harrington Harbour, Saguenay County, Quebec, on the north shore of the Gulf of St. Lawrence, has been added to the collections of the National Museum of Canada. Another adult of this species was captured alive near Harrington Harbour in January, 1940, and was shipped by aeroplane to the Quebec Zoological Garden.

Mr. Fred W. Osborne, of Harrington Harbour, wrote from that place on February 4, 1940, that Ivory Gulls had been quite plentiful there, as well as at the next three communities to the northeast, namely, Whale Head, Mutton Bay,

and La Tabatière. These Gulls were seen chiefly while coastal seal-fishing was being carried on (in December and January), and the greatest numbers were observed at places where captured seals were being cut up. They greedily ate billed Gulls and 3 young Herring Gulls on clotted blood and bits of flesh and blubber. Several juveniles were noticed among them. The occurrence was so unusual in the region as to excite general remark. After the close of the seal-fishing season, the Ivory Gulls gradually departed. The last one recorded at Harrington Harbour was seen soon after the middle of February.

On March 12, 1940, I saw the adult Ivory Gull that was then confined in a large enclosure at the Quebec Zoological Garden. It was being fed smelts and ground meat and was said to have a good appetite. It appeared active and healthy and flew readily about its cage. The bright orange tip of its beak, being the only color in its ensemble, was very conspicuous. It is unfortunate that this individual did not long survive.

The flight of Ivory Gulls along the north shore of the Gulf of St. Lawrence extended at least as far west as Natashquan. A juvenile specimen taken there on or shortly before January 2, 1940, was sent to the National Museum of Canada.—HARRISON F. LEWIS.

A NESTING COLONY OF RING-BILLED GULLS (*Larus delawarensis*) IN THE ST. LAWRENCE RIVER NEAR GANANOQUE, ONTARIO.—Through the kindness of Dr. Gordon Byers, of Montreal, Lewis visited, in his company, on May 24, 1940, Black Ant Island, in the St. Lawrence River, about four and one-half miles south of Gananoque, Ontario. About 200 adult Ring-billed Gulls and 2 adult Herring Gulls were seen at that time on the reef at the western end of this small island. Dr. Byers, who is the proprietor of the island, stated that the Ring-billed Gulls had nested a great many enquiries concerning the identity there annually for many years, but no nests or eggs were observed during this visit.

On July 3, 1940, Hennessy visited Black Ant Island, where he found both Ring-billed Gulls and Herring Gulls nesting. He estimated that he observed, on and about the island, 300 adult Ring-billed Gulls, and 12 adult Herring Gulls. He found the young Gulls at that time to be of the right size for banding and, with the assistance of his father, banded 158 young Ring- this island. All Gull nests observed were on a small rocky reef which is cut off, west of the principal part of the island, by a narrow, shallow passage, and therefore actually forms a separate island, though not usually so reckoned.

Although there is apparently no certain record of the nesting of the Ring-billed Gull in New York State, it may be of interest to remark that the nesting colony of this species at Black Ant Island, Ontario, is less than a mile and a half from Grindstone Island, New York.—HARRISON F. LEWIS and T. S. HENNESSY.

NATURAL CONTROL OF THE CECROPIA MOTH—During the spring and early summer of 1939 the Royal Ontario Museum of Zoology received of the cecropia moth (*Platysamia cecropia*). The Toronto newspapers, being likewise harassed by the public, published short articles, together with photographs, on the cecropia moth. It was apparently a "peak year" for this moth.

During this time a number of larvae, which were obtained from eggs deposited by female moths sent to the Museum, were placed out-of-doors on some small willows and Manitoba maple in such a manner that a check could be made on their numbers. Towards the end of the summer most of the larvae had been destroyed, possibly by birds, and, of the remainder, all were heavily parasitized. From this we anticipated a great reduction in the population of the cecropia moth for the summer of 1940; such proved to be the case. Only eight enquiries concerning the cecropia moth were received by the Museum in the summer of 1940.—F. A. URQUHART and C. E. CORFE.

ANOTHER SCISSOR-TAILED FLYCATCHER IN QUEBEC.—On October 30, 1939, a Scissor-tailed Flycatcher (*Muscivora forficata*) was observed, alive but struggling in a weakened condition, in a ditch within the town limits of Noranda, Quebec. It was taken up and brought to Mrs. L. C. Bent of the local branch of the Society for the Prevention of Cruelty to Animals who attempted to revive it but without success, and the next morning it was dead. The remains were given to Mr. J. A. Hedge who mounted it. Later Mrs. Bent communicated the interesting occurrence to the national collection where it is now preserved.

The Scissor-tailed Flycatcher is a most spectacular bird regularly inhabiting the southwestern States, its northern limit being about southern Kansas. Though actually not larger than a Kingbird it has a deeply forked swallow-tail

nearly ten inches long. In color, the body is a symphonic arrangement of pearl gray, rose pink, and white, with shoulder and underwing patches of scarlet. The flowing tail is beautifully and strongly patterned in black and pinkish white. Altogether it is more like a delicate drawing from a Japanese screen than a real bird of northern climes.

There are several other records of occurrence in Canada, the most extraordinary being two from York Factory on Hudson Bay taken forty-four years apart, 1880 and 1924, both of which are in the National Museum. Specimens have been taken at Portage la Prairie, Manitoba; Pointe des Monts, Quebec; and Clarendon Station, Alma and Grand Manan, New Brunswick. Besides these actually taken, there are creditable sight records of this quite unmistakable bird reported from southern Manitoba in 1899, 1908 and 1930.—P. A. TAVERNER.

RECENT WESTERN RECORDS OF BLACK DUCK. (*Anas rubripes*).—On September 23rd, 1940, D. A. Ross, B.S.A., while engaged in biological investigations for Ducks Unlimited (Canada) collected a Black Duck (*Anas rubripes*) which was in company with four Mallards (*Anas platyrhynchos*), on Big Lake, Township 109, Range 5, W. 4th, Athabaska Delta, Northern Alberta. The sex was not determined. The specimen has been deposited in the National Museum, Ottawa.

Another Black Duck was seen by Ross on August 6, 1940, on Fletcher Channel, Athabaska Delta, also in company with Mallards.

Judge A. E. Bence of Battleford, Saskatchewan reports "Last fall I shot a drake (Black Duck) feeding with Mallard on the stubble. This year I got a double in the marsh—one was a female Black Duck, the other a Mallard."

A Black Duck male was banded 40-678957 by W. G. Leitch at Imperial Beach, Last Mountain Lake, Saskatchewan, on October 23, 1940. It was taken with 13 Mallards in a trap.

R. D. Harris, banding waterfowl at Jackfish Lake, Big Grass Marsh near Langruth, Manitoba, records banding an adult female Black Duck 39-668949 on September 23, 1940; an adult male, 140-611054 on October 10, 1940; and an immature male, 140-611079 on October 11, 1940. All were accompanied by Mallards in the traps. —B. W. CARTWRIGHT.

LATE NESTING OF RED-EYED VIREO (*Vireo olivaceus*)—The Red-eyed Vireo is a common summer resident in Nova Scotia, and over a period of sixteen years the average date of "first seen" in the spring is May 26th, while the average date of "last seen" over a period of 6 years is September 11th. Regarding its nesting my records show that on June 18th, 1913, a nest containing four eggs was found, and that would appear to be a normal date for a first nest.

On August 10th, 1940, a pair of these birds was seen near Hazel Hill, Guysboro County, Nova Scotia, actively engaged at building a nest. This was reported to me by Martin H. Bushell, an enthusiastic young bird student of Hazel Hill; in addition to sending me a detailed description of the birds and nest, he included a very good pencil sketch showing the nest and the sitting bird. The nest was in a birch tree and the pair seemed to be working with feverish haste. On August 16th the observer examined the nest which at that date was found to contain two eggs and on August 30th it held three very young vireos. The nest was kept under surveillance and on September 9th the young left and were last seen perched near the nest-site and taking food from both parents.—R. W. TUFTS.

We are indebted to Dr. J. B. Tyrrell for information which has enabled us to discover that Chief Factor James Anderson's Back River Journal was published in 1920 by the Women's Canadian Historical Society of Toronto as a part of their Transaction No. 20. While the publication in the Canadian Field-Naturalist is thus deprived of any claims to originality, we feel that it is amply justified because of the stress laid on natural history in its annotations, and perhaps also as making the journal available to a different group of individuals and institutions.—EDITOR.

Orchis rotundifolia Banks var *lineata* var. nov.

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VOL. LV, No. 6 SEPTEMBER, 1941

THE CANADIAN FIELD-NATURALIST

Museum of Comparative Zoology
SEP 22 1941
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PLATE I

Spiranthes vernalis Engelon. and Gray (upper row)

Spiranthes cernua (L.) L. C. Richard (lower row)

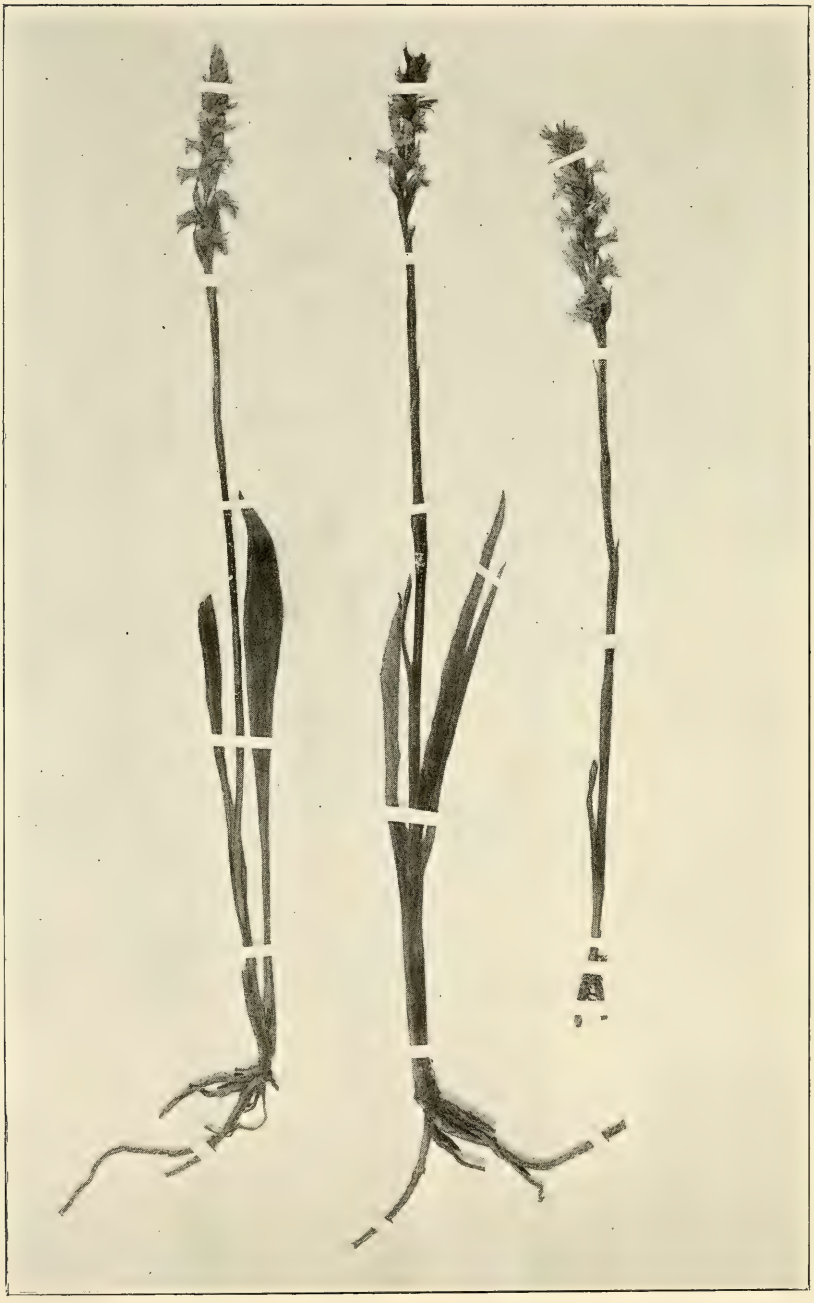

PLATE II

Spiranthes cernua (L.) L. C. Rich. var. *odorata* (Nutt.) Correll.

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The Canadian Field-Naturalist

VOL. LV OTTAWA, CANADA, SEPTEMBER, 1941 No. 6

TWO ORCHIDS NEW TO THE PROVINCE OF QUEBEC AND THE DOMINION OF CANADA, SPIRANTHES VERNALIS Engelm. & Gray and SPIRANTHES CERNUA (L.) L. C. Rich. var. ODORATA (Nutt.) Correll.

By HENRY MOUSLEY

IN *The Canadian Field-Naturalist* of May, 1924[1] two orchids were recorded by me from Hatley, Que., under one name, viz: *Spiranthes cernua* (L.) Rich. var. *ochroleuca* (Rydberg) Ames, which at the time I took them to be. Even if they had been var. *ochroleuca,* I was too busy then with the flora and fauna of this section of the Eastern Townships (no intensive study existing at the time) to realize that this variety was (and still is) unrecorded for the Province of Quebec, as well as for the Dominion of Canada. However, specimens were collected and put away for future reference and it is only recently that I decided to do something further in the matter. Fortunately, it came to my knowledge that Dr. Donovan S. Correll of the Botanical Museum of Harvard University was engaged on a special study of the species of *Spiranthes* which are extremely difficult and variable. After writing, I sent Dr. Correll all the plants I collected in 1923 to be critically examined, and am certainly gratified with the results. From his reply to my letter I concluded that in his opinion, and that of others at Harvard, *S. cernua* var. *ochroleuca* is a most unsatisfactory variety. He believes that a species, variety or hybrid, to be recognizable, must have some morphological character by which it may be recognized. He does not think that var. *ochroleuca* has any distinct character which sets it off immediately from related forms. Quoting from another letter, Dr. Correll says,

> "As soon as I have time to do so, I hope to work out the confusion which now exists concerning these plants, that is the complex which centers around *Spiranthes cernua* and *S. vernalis,* and includes *S. praecox, S. cernua* var. *odorata, S. cernua* var. *ochroleuca* (which variety is doubtlessly referable to the *S. vernalis* and *S. cernua* mix-up) as well as several additional allied species and varieties in this complex. No *Spiranthes* has been more misunderstood than *S. vernalis.*"

In view of the above, my case rests, as counsel would say, for the error I made in 1924.

Coming now to the illustrations, where the six upper plants depicted in Plate 1 represent *Spiranthes vernalis* Engelm. & Gray, whilst the seven lower ones are *Spiranthes cernua* L. C. Rich. These latter have been added as showing the great difference in the general appearance of these two species, as well as that of var. *odorata* of *S. cernua* shown later in Plate 2. My tallest plant of *S. vernalis* measures 33 cm. in height, the average of 116 plants measured on the ground being 21 cm., with a raceme of 5.8 c.m. (the longest raceme measuring 10.5 cm.). The blooms are decidedly yellowish, in a one-ranked raceme, and appear about the first week in September. They were found growing at the foot of a long sloping field with *S. cernua* var. *odorata,* the former in the higher and drier ground, the latter in the lower and damper portion of the field. The lip of *S. vernalis* looks like a small var. *odorata* broadly ovate in shape and about 6 mm. long. Answering a question of mine Dr. Correll says,

> "I have seen much more robust plants of *S. vernalis* from New Jersey, Virginia, N.C., Texas, Arkansas, etc., than those you sent me. I would say that your plants of *S. vernalis* are the average run of plants that I have seen. As to whether the species is 'creeping up north' I cannot say. It is true that your specimens are the first I have seen from Canada—and as I am able to determine, the first record from Canada. However, this may be due to the lack of collecting as well as to rarity of the species."

In Plate 2 we see three plants of *S. cernua* (L.) L. C. Rich. var *odorata* (Nutt.) Correll. Their average height is 23.50 cm. with a raceme of

1. Can. Field-Nat. vol. 38, No. 6, May, 1924, p. 88.

5.17 cm., which is a trifle above that of 32 plants measured on the ground. As already mentioned these were growing with *S. vernalis,* but as a general rule, in the damper portion of the ground. They are generally stoloniferous, and the blooms are very fragrant of vanilla, sometimes of a creamy yellowish white, in a 3- or 4-ranked raceme. The lip of this variety is broadly triangular tapering to a more or less sharp apex. It is thought that possibly the var. *ochroleuca* of *S. cernua* may eventually be placed in variety *odorata* after additional study of this knotty problem.

In conclusion, the two plates are reproductions of sheets Nos. 135 and 136 in my Herbarium, both of which are endorsed by Dr. Correll as being what are considered correct identifications at Harvard. Like Dr. Correll, I have been unable to find any reference whatsoever to *Spiranthes vernalis* having been recorded in the Dominion of Canada, and the same remark applies also to *S. cernua* var. *odorata.* As a matter of fact, I imagine they have always been looked upon here as being entirely southern plants (as indicated by the range given in the various Manuals on Botany). This no doubt considerably influenced my decision when finding the plants. Finally, my very best thanks are due and herewith tendered to Dr. Correll for all the trouble he has taken in this matter, as well as allowing me to quote from his various letters, as a help to a better understanding of this complicated group.

Since the above was written, I have discovered *S. vernalis* Engelm and Gray near Montreal, thus extending its range 120 miles north of Hatley.

THE SPECIES OF NEMOBIUS (Orthoptera, Ensifera) IN ONTARIO

By F. A. URQUHART*

See Plates I and II at back of this issue.

SINCE Dr. Walker's publication (1904) on the Ontario species of *Nemobius,* one additional species (Walker and Urquhart 1940) and a race of *fasciatus* (hitherto unreported) have been added to Walker's list. Further data on the distribution of the various species in Ontario have also been obtained.

KEY TO THE ONTARIO SPECIES OF NEMOBIUS

1. Lower margin of the apex of the ovipositor with a number of minute and widely spaced teeth (fig. 10); lower pair of apical spurs of the hind tibiae of equal length ..... *carolinus carolinus.*
   Lower margin of the apex of the ovipositor without minute teeth; lower pair of apical spurs of hind tibiae unequal in length, the inner one longer ..... 2.
2. Ovipositor about two-thirds as long as the hind femora and slightly upcurved (fig. 9); size small ..... *cubensis palustris.*
   Ovipositor as long as or barely shorter than the hind femora, straight or nearly so; medium size ..... 3.
3. Ovipositor not exceeding the length of the hind femora (fig. 8); mottled with black, especially in the female; wings absent ..... *maculatus.*
   Ovipositor distinctly longer than the hind femora, except in individuals of *fasciatus socius;* not mottled with black; wings often fully developed (macropterous form) ..... 4.
4. Face below the antennae a uniform dark piceous (fig. 4); grayish black in colour; lateral margins of the dorsal field of the male tegmina narrowly yellow; ovipositor one fourth longer than the hind femora (fig. 7) ..... *griseus griseus.*
   Face below the antennae not a uniform shining piceous; not grayish black in colour ..... 5.
5. Rusty black to sooty brown; occiput with four distinct dark stripes; larger, males 7.2 - 10.6 mm., females 8 - 11.5 mm.; apex or ovipositor narrowly sublanceolate, enlarged portion longer (fig. 5) ..... *fasciatus fasciatus.*
   Very dark, almost black; dark stripes on the occiput indistinct; smaller, males 6.7 - 8 mm., females 7.3 - 9 mm.; apex of ovipositor sublanceolate, enlarged portion shorter (fig. 6) ..... *fasciatus abortivus.*

Nemobius carolinus carolinus Scudder.—

At Point Pelee *Nemobius c. carolinus* was one of the most abundant species of Orthoptera inhabiting forest areas. Here they were found running over the dead leaves of the forest floor, especially in the more humid areas. A number of specimens were found beneath decaying logs and other surface debris. The males only gave vent to their low trilling stridulation when protected by a log or a pile of leaves. The females

* Royal Ontario Museum of Zoology, Toronto.

were not at all cautious and could be seen running in every direction.

A number of macropterous individuals were taken at the margin of a sphagnum bog in the vicinity of Ottawa. At first they were considered as the long-winged form of *Nemobius carolinus* but, since these individuals were quite different from the typical *carolinus* in the much darker coloration, pronounced longitudinal veins of the tegmina, absence of light spots on the abdomen and the ovipositor being almost straight, not distinctly arcuate, it was described as a new species (Urquhart, 1938). Since my description of *Nemobius macdunnoughi* a number of other specimens have been taken leaving no doubt that the latter was but a dark, long-winged form of *carolinus*. *Distribution*: This species has been previously recorded by Walker (1901) as *Nemobius palustris* from Lake Simcoe, Sarnia, Southampton and Owen Sound; and as *N. angusticollis* (1904) from Severn River and Toronto. Specimens have also been taken at Brockville, Niagara Glen, Temagami, Hawthorn, Constance Bay, Point Pelee and Port Rowan. The probable distribution is shown in fig. 11.

Nemobius cubensis palustris Blatchley.—

This species was found in considerable numbers in a rather extensive bog at Hawthorn in the vicinity of Ottawa. Specimens have also been taken in similar situations in the more northern parts of Southern Ontario.

Distribution: This species has been previously recorded by Walker (1903, 1904) as *Nemobius palustris* from Ragged Lake, Algonquin Park. Specimens have also been taken at Hawthorn (Mer Bleu).

Although specimens have been taken in only two localities in Ontario it probably occurs in sphagnum bogs throughout the northern parts of Southern Ontario, as shown in fig. 12.

Nemobius maculatus Blatchley.—

At Point Pelee *Nemobius maculatus* was abundant in a small strip of virgin wood composed of mixed deciduous trees. The preference, on the part of this species, for dry, open areas in the wood was decidedly well marked. This particular strip of wood was rather unusual in that the ground was thrown up into two long, narrow ridges that were possibly formed by wave action during the time that this portion of Point Pelee was covered with water: This resulted in two areas of dry ground with an intervening humid, shallow valley. Specimens of *N. maculatus* were seen running over the leaf-strewn ground on the dry ridges but not a single specimen was found in the humid valley, although collections were made in the latter area throughout the summer. *N. carolinus* was also abundant but, unlike *maculatus*, it was found to be more abundant in the humid portions and, more sparingly, in isolated areas on the drier ridges.

Distribution: This species has been previously recorded from Point Pelee by Walker and Urquhart (1940). The probable distribution is shown in fig. 13.

Nemobius griseus griseus E. M. Walker.—

This species has been previously recorded by Walker (1904) from Toronto, Sarnia and De Grassi Point, Lake Simcoe. Specimens have also been taken at Fort William. The latter are distinctly darker in colour than those from the other localities.

Owing to the lack of sufficient records it is not possible to give the distribution of this species in Ontario. However, from the records obtained, it would appear that *N. griseus* is found in sandy situations, at the margins of the Great Lakes. This has been indicated in the accompanying figure (fig. 14).

Nemobius fasciatus fasciatus (De Geer).—

This is the most abundant and ubiquitous species of *Nemobius* found throughout the greater part of Southern Ontario. During late summer almost every small area of short grass may be fairly teeming with these small, black, active ground crickets. They seem to have a marked preference for areas of short grass and are rarely found in situations where there is a dense growth of vegetation or in humid situations. Dry sandy uplands, especially those devoted to cattle grazing form ideal situations for this species.

Distribution: *Nemobius f. fasciatus* has been previously recorded by Walker (1901) as *N. maculatus* from Tobermory; as *fasciatus* (1904) from Niagara Falls, Point Pelee, Arner, Chatham, Sarnia, Goderich, Southampton, Owen Sound, Hamilton, Toronto, Lake Simcoe, Severn River, Lake Muskoka, North Bay, Stony Lake; and from Bear Island and elsewhere in the Temagami District (1909). Specimens have also been taken at Rainy River, Constance Bay, Hawthorn, Wheatley, Harrow, Windfall, Guelph, Ottawa, Ventmore,

Vineland, Palmer Rapids, Picton, Lancaster and Brockville.

The probable distribution of this species is shown in figure 16.

Nemobius fasciatus socius Scudder.—

This race of *fasciatus* was first taken by the author in High Park, Toronto. Its presence, at this time, was made known by the distinctive stridulation of the male that in no way resembled that of *fasciatus,* but was rather suggestive of the field cricket (*Gryllus assimilis*) in that it consisted of a regular series of notes. All of the specimens were taken close to the margin of a large pond (Grenadier Pond). The vegetation in the area occupied by *socius* consisted of tall grasses and sedges (*Carex, Acorus, Cyperus, Calamagrostis, Panicum*). Not a single specimen was found in the dry grass areas surrounding the pond, although typical *fasciatus* was quite abundant in such areas.

The morphological differences between the two subspecies, *fasciatus* and *socius,* are slight (hence *socius* has been omitted from the accompanying key). Fulton (1931) is of the opinion that the three subspecies of *fasciatus,* namely *fasciatus, tinnulus* and *socius,* are physiologically distinct but they have not diverged far enough morphologically to make exact classification possible. In addition to the slight differences in the male tegmina and the ovipositor of the female, as pointed out by the above author, the head of *socius* is slightly larger and more distinctly marked than that of *fasciatus* in both sexes.

Distribution: All of the specimens obtained from the following localities were taken from situation similar to that described above; Lancaster, Brockville, Picton, Toronto. Males of this race have also been heard stridulating at Bracebridge.

The probable distribution of this race is shown in fig. 15.

Nemobius fasciatus abortivus Caudell.—

This race may be readily distinguished from *fasciatus* and *socius* by its smaller size, dark coloration, extreme abbreviation of the tegmina and by the differences in the ovipositor of the female as shown in the accompanying figure (fig. 17).

Distribution: This is a western race of *fasciatus.* The only Ontario record is that of Walker (1911) from Fort William in extreme western Ontario. It is quite unlikely that this race extends east of Lake Nipigon.

The probable distribution of this race is shown in fig. 17.

ACKNOWLEDGMENT

I wish to express my sincere thanks to Dr. B. B. Fulton of the University of North Carolina for his helpful suggestions and for specimens of typical *Nemobius fasciatus socius* and *N. f. tinnulus.*

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CORRIGENDA. The text of three items of "Notes and Observations", on page 77, in the May issue, No. 5 of this volume, was unfortunately affected by misplacement of two complete lines. In the first column on that page the sixth line from the top, reading "billed Gulls and 3 young Herring Gulls on", should be removed from that position and inserted immediately prior to the bottom line. In addition, the forty-third line in the first column, reading "a great many enquiries concerning the identity", should be removed from that position and should be inserted in the second column on the page, as the fourth line in the note entitled "Natural Control of the Cecropia Moth".—Editor.

PRELIMINARY LIST OF AMPHIBIANS FROM THE LAURENTIDES PARK IN THE PROVINCE OF QUEBEC

By VADIM D. VLADYKOV*

SINCE the opening of the Biological Station in the Laurentides Park in June, 1938, intensive collecting of amphibians was made by members of this laboratory.

The specimens were kindly identified by Dr. A. H. Wright and Mr. H. Trapido of Cornell University, to whom the author wishes to express his deep appreciation for their valuable co-operation.

The literature information for this region of the Province of Quebec is practically lacking. Among recent herpetological accounts of Quebec, may be mentioned papers by Trapido and Clausen (1938), Moore and Moore (1939) and Patch (1939).

The Laurentides Park, occupying a territory over 4,000 square miles, is situated between the City of Quebec and Lake St. John. In spite of excessive cutting of woods and building of dams in certain parts of the Park, this immense reserve is still quite virgin area. The elevation of the Park varies between one and three thousand feet above sea level. Due to its relatively high altitude and geographical position the climate is cold. The northern end, closest to Lake St. John, has the lowest altitude, around one thousand feet, and consequently warmer summers. For this reason, several forms found here are absent in the more southern, but higher part of the Park.

The herpeto-fauna of the Park is very limited. There are no reptiles.[1] Among the amphibians, such common forms as *Rana catesbiana, R. palustris* and *R. pipiens* are completely absent.

List of Species

1. *Triturus viridescens viridescens* (Rafinesque). Found only in the northern section, namely in Lac aux Lézards (1,375 feet), Camp des Ecorces, and Lac aux Sarracénies (1,750 feet), Camp Le Gîte. These lakes are small, with muddy bottom, abundant vegetation and are warm during the summer months. In the first lake, on July 23, 1939, were found an adult male and female, which measured[2] 104 and 80 millimeters respectively.

A great number of larvae between 35 and 45 millimeters had been collected, on September 26, 1939, in Lac aux Sarracénies. They would pass the winter in the Park as larvae. But when they were brought alive to our Montreal Laboratory and kept at room temperature, they lost their gills in about two weeks time.

2. *Ambystoma jeffersonianum* (Green). Only one larva, 54 millimeters long, was collected. It was taken by the author on September 26, 1939, in Lac aux Sarracénies (1,750 feet).

3. *Eurycea bislineata major* Trapido and Clausen. According to Mr. Trapido all our material belongs to this new subspecies, recently described from Quebec (Trapido and Clausen, 1938 and 1940).

The larvae of this subspecies were found in most of the brooks of the Park in an altitude, ranging from 1,100 to 3.000 feet. The best collecting places are located near the entrance of the charge or mouth of discharge of a lake where the bottom is well covered with moss, and the water is highly oxygenated. Quite often these salamanders can be taken around the edges of lakes under stones. On many occasions, in the same spot, larvae of different sizes were observed.

The temperatures of water frequented by larvae vary during summer months from 10° to 20° C. The range of pH is 5.0 to 6.3. The concentration of oxygen and carbon dioxide, in parts per million, were 7.6 - 10.0 and 0.7 - 4.5 respectively.

The lengths of three adult specimens, were as follows: 88, 92 and 108 millimeters respectively. The first two were found under decaying wood about six feet from the edge of Petit Lac Warren (2,700 feet), Camp Jacques-Cartier, on August 30, 1940, by Mr. V. Legendre, Assistant. The largest specimen was taken on September 19, 1938, by the author at one of the charges of Grand Lac à l'Epaule (2,127) feet), Camp Devlin.

4. *Bufo americanus* Le Conte. Two subspecies, *B. americanus americanus* Holbrook and *B. americanus copei* Yarrow and Henshaw, are represented in the Park. They are found quite often together around the same lake. However, sub-

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1. In spite of intensive collecting, only one reptile was found in the Park, namely a female **Chrysemys picta picta** (Schneider) caught by the author, on June 7, 1939, in Lac à Régis (2,300 feet), Camp Mercier, situated 37 miles north of Quebec City. This specimen had a carapace almost six inches long. It is most probable that this turtle was brought by some visiting tourist to that lake.

(2) The measurements throughout the present article are made on specimens preserved in 4% formaline solution.

species *copei* more typically frequents higher altitudes, for instance, around Camp Jacques-Cartier (2,575).

The subspecies *americanus* was obtained around Lac à Noël (2,300 feet), Camp Mercier. During 1939, the spawning concentration of this form was observed for the first time on June 8, near the discharge of Lac à Noël, where the surface temperature was 15.5° C. and air 20.4° C. (10.15 a.m.). The eggs of this toad were collected in a nearby lake (Lac Bec-Croche) on June 11, 1939, when the water temperature at the surface wwas 16.5° C.

In general, toads of both subspecies spawn in the Park, during June, around edges of the lakes. The transformation of tadpoles takes place usually at the end of September of the same year. However, it is quite probable that in some lakes this change takes place only next spring.

5. *Hyla crucifer* Wied. Six specimens were collected. Three frogs were found in stomachs of *Salveninus fontinalis* obtained on the territory of Camp Mercier. One of these trout was taken on June 8, 1939, in Lac Regis (2,300 feet) and another, with two frogs, was caught three days later in Lac Bec-Croche (2,350 feet). On the latter date (June 11, 1939) on the edge of that lake, a male frog was captured by Mr. C. Gauthier, student of the University of Montreal. Two other males were collected by the same student on the following dates: one on June 10, 1939, at Lac Tremblay (2,200 feet), Camp Devlin, and the other on July 19, 1940, at Lac Beauséjour (2,700 feet), Camp Jacques-Cartier. In every case these frogs were taken on marshy parts of the lakeshore. No doubt the spring peeper has a much wider distribution in the Park than our collections show.

6. *Rana clamitans* Latreille. This frog is rather rare in the Park. Its distribution is confined almost exclusively to the northern section. Several tadpoles and adults were taken around Camps Belle-Rivière (1,155 feet), Les Ecorces (1,375 feet) and Le Gîte (1,750 feet). The adults were also found in Lac Turgeon (2,380 feet), Camp Château-Beaumont, in the St. Urbain section of the Laurentides Park. A tadpole, apparently belonging to this species, was caught in Lac à Régis (2,300 feet), Camp Mercier.

R. clamitans are often found together with *R. septentrionalis* in the same lakes. The largest specimen (male) of *R. clamitans* measured 75 millimeters without legs.

7. *Rana septentrionalis* (Baird). The mink frog is the most typical species of the Park and is found in every lake. Spawning takes place during July, when frogs are seen swimming as far as two or three hundred feet off shore. The choice places are the submerged islands with thick aquatic vegetation or floating trunks of trees. During this season, their characteristic calling is heard every evening.

At the end of the first summer, the tadpoles of the mink frog reach a total length of about 45 millimeters. Their hind legs are barely visible. They obtain full growth at the end of the next summer. The large tadpoles, up to 90 millimeters, are seen during July and August close to the lakeshore among aquatic vegetation. Transformation usually takes place around the middle of August, when in the same place can be seen grown tadpoles, individuals with rudimentary tails, and young frogs. The size of a newly transformed specimen is up to 38 millimeters, without legs. The largest adult (female) measured 72 millimeters, without legs.

The mink frog is also a very common form around Cascapedia on the Gaspé Peninsula (Moore and Moore, 1939).

8a. *Rana sylvatica sylvatica* Le Conte. Only one specimen of this subspecies was collected. It was taken by the author on June 11, 1939, at Lac Bec-Croche (2,300 feet).

8a. *Rana sylvatica cantabrigensis* Baird. This northern subspecies was taken in several places from Camp Mercier (2,300 feet) to Camp Portes-de-l'Enfer (2,475 feet). The wood-frog seemingly avoids the northern part of the Park, which is lower than 2,000 feet. It is always found around marshes. This agile frog is particularly noticeable during rainy weather.

It spawns early in June. In 1939, masses of eggs of the wood-frog were seen in roadside ditches around Camp Mercier on June 5, when the air temperature during the daytime was around 20° C.

In higher altitudes, as for instance, around Camp Jacques-Cartier (2,575 feet) and Lac des Neiges (2,750 feet), the specimens of *cantabrigensis* have a characteristic whitish stripe along the middle of the back, from the snout to the anus. In lower autitudes, this white line is lacking.

The northern records of the wood-frog in Canada are summarized by Patch (1939).

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A STUDY OF THE FLORA OF WELLINGTON COUNTY, ONTARIO

By JOHN J. STROUD

(*continued from page* 76)

ROSACEAE

Physocarpus opulifolius (L.) Maxim.
Spiraea alba Du Roi. (*S. salicifolia* L.)
S. latifolia (Ait.) Borkh.
**Malus pumila* Mill. (*Pyrus Malus* L.)
**Aronia arbutifolia* (L.) Ell. (*Pyrus arbutifolia* (L.) L. f.)
A. melanocarpa (Michx.) Britton. (*Pyrus melanocarpa* (Michx.) Willd.
Sorbus americana Marsh. (*Pyrus americana* (Marsh.) DC.)
**S. Aucuparia* L. (*Pyrus Aucuparia* (L.) Ehrh.)
Amelanchier laevis Wieg. (*A. canadensis* (L.) Medic.)
A. stolonifera Wieg. (*A. oblongifolia* (T. & G.) Roem.)
A. sanguinea (Pursh) DC. (*A. spicata* (Lam.) C. Koch)
**Crataegus monogyna* Jacq. (*C. Oxyacantha* L.)
C. punstata Jacq.
C. intricata Lange. (*C. coccinea* L.)
Fragaria virginiana Duchesne.
F. vesa L. var. *americana* Porter.
Waldsteinia fragarioides (Michx.) Tratt.
Potentilla norvegica L. var. *hirsuta* (Michx.) Lehm. (*P. monspeliensis.* L.)
P. argentea L.
**P. recta* L.
P. palustris (L.) Scop.
P. Anserina L.
P. canadensis L.
Geum canadense Jacq.
G. virginianum L.
G. aleppicum Jacq., var. *strictum* (Ait.) Fernald. (*G. strictum* Ait.)
G. rivale L.
G. triflorum Pursh.
Rubus idaeus L.
R. occidentalis L.
R. odoratus L.
R. pubescens Raf. (*R. triflorus* Richard.)
R. allegheniensis Porter.
R. frondosus Bigel.
**Alchemilla vulgaris* L.
Agrimonia gryposepala Wallr.
**Sanguisorba minor* Scop.
Rosa blanda Ait.
**R. rubiginosa* L.
Prunus serotina Ehrh.
P. virginiana L.
P. pennsylvanica L. f.
P. depressa Pursh. (*P. pumila* L.)
P. nigra Ait.
P. americana Marsh.

LEGUMINOSAE

Gleditsia triacanthos L.
Lupinus perennis L.
**Trifolium arvense* L.
**T. incarnatum* L.
**T. pratense* L.
T. repens L.
**T. hybridum* L.
**T. procumbens* L.
**Melilotus officinalis* (L.) Lam.
**M. alba* Desr.
**Medicago sativa* L.
**M. falcata* L.
**M. lupulina* L.
**Anthyllis Vulneraria* L.
**Lotus corniculatus* L.
**Robinia Pseudo-Acacia* L.
**R. viscosa* Vent.
Astragalus canadensis L.
Desmodium pauciflorum (Nutt.) DC.
D. canadense (L.) DC.
Lespedeza hirta (L.) Hornem.
**Vicia angustifolia* (L.) Reichard.
V. Cracca L.
V. americana Muhl.
**V. villosa* Roth.
Lathyrus ochroleucus Hook.
**L. latifolius* L.
Apios americana Medic. (*A. tuberosa* Moench.)
Amphicarpa bracteata (L.) Fernald. (*A. monoica* (L.) Ell.)
**Pisum sativum* L.

LINACEAE

**Linum usitatissimum* L.

OXALIDACEAE

Oxalis montana Raf. (*O. Acetosella* L.)
O. stricta L.
O. europaea Jord. (*O. corniculata* L.)
O. corniculata L., var. *viscidula* Wieg. (*O. repens* Thunb.)

GERANIACEAE

Geranium maculatum L.
**G. pratense* L.
G. Robertianum L.
**G. pusillum* Burm. f.

RUTACEAE

Zanthoxylum americanum Mill.

POLYGALACEAE

Polygala paucifolia Willd.
P. Senega L.

EUPHORBIACEAE

Acalypha virginica L.
Euphorbia polygonifolia L.
E. nutans Lag. (*E. Preslii* Guss.)
E. hirsuta (Torr.) Wiegand.
E. maculata L.
**E. platyphylla* L.
**E. Helioscopia* L.
**E. Esula* L.
**E. Cyparissias* L.
**E. Peplus* L.

LIMNANTHACEAE

Floerkea proserpinacoides Willd.

ANACARDIACEAE

Rhus typhina L.
R. Toxicodendron L.
R. canadensis Marsh.

AQUIFOLIACEAE

Ilex verticillata (L.) Gray.
Nemopanthus mucronata (L.) Trel.

CELASTRACEAE

Evonymus europaeus L.
E. obovatus Nutt.
Celastrus scandens L.

STAPHYLEACEAE

Staphylea trifolia L.

ACERACEAE

Acer spicatum Lam.
A. saccharum Marsh.
A. nigrum Michx. f. (*A. saccharum* Marsh., var. *nigrum* (Michx.) Britton)
**A. platanoides* L.
A. saccharinum L.
A. rubrum L.
**A. Negundo* L.

SAPINDACEAE

**Aesculus Hippocastanum* L.
**A. glabra* Willd.

BALSAMINACEAE

Impatiens pallida Nutt.
I. biflora Walt.

RHAMNACEAE

Rhamnus alnifolia L'Her.
**R. cathartica* L.
**R. Frangula* L.
Ceanothus americanus L.

VITACEAE

Parthenocissus quinquefolia (L.) Planch. (*Psedera quinquefolia* (L.) Greene.)
Vitis vulpina L.

TILIACEAE

Tilia americana L.

MALVACEAE

**Abutilon Theophrasti* Medic.
**Althaea rosea* Cav.
**Malva rotundifolia* L.
**M. moschata* L.
Hibiscus Moscheutos L.
**H. Trionum* L.

HYPERICACEAE

Hypericum Ascyron L.
**H. perforatum* L.
H. punctatum Lam.
H. boreale (Britton) Bicknell.
H. majus (Gray) Britton.
H. virginicum L.

VIOLACEAE

Viola cucullata Ait.
V. nephrophylla Greene.
V. papilionacea Pursh.
V. palmata L.
V. sororia Willd.
V. septentrionalis Greene.
V. Selkirkii Pursh.
V. blanda Willd.
**V. odorata* L.
V. pubescens Ait.
V. eriocarpa Schwein. (*V. scabriuscula* Schwein.)
V. canadensis L.
V. conspersa Reichenb.
V. rostrata Pursh.
**V. arvensis* Murr.

THYMELAEACEAE

Dirca palustris L.
**Daphne Mezereum* L.

ELAEAGNACEAE

Shepherdia canadensis Nutt.

LYTHRACEAE

Decodon verticillatus (L.) Ell.
**Lythrum Salicaria* L.

ONAGRACEAE

Epilobium angustifolium L.
**E. hirsutum* L.
E. densum Raf.
E. molle Torr.

E. coloratum Muhl.
E. glandulosum Lehm., var. *adenocaulon* Haussk. (*E. adenocaulon* Haussk)
Oenothera muricata L.
O. Victorinii Gates & Catchside. (*O. biennis* L.)
O. perennis L. (*O. pumila* L.)
Circaea latifolia Hill. (*C. lutetiana* L.)
C. alpina L.

HALORAGIDACEAE

Myriophyllum exalbescens Fernald. (*M. spicatum* L.)

ARALIACEAE

Aralia racemosa L.
A. nudicaulis L.
Panax quinquefolium L.
P. trifolium L.

UMBELLIFERAE

Sanicula marilandica L.
Erigenia bulbosa (Michx.) Nutt.
Osmorhiza Claytoni (Michx.) Clarke.
O. longistylis (Torr.) DC.
**Aegopodium Podagraria* L.
Cicuta maculata L.
C. bulbifera L.
**Carum Carvi* L.
Sium suave Walt. (*S. cicutaefolium* Schrank.)
Cryptotaenia canadensis (L.) DC.
Zizia aurea (L.) Koch.
Taenidia integerrima (L.) Drude.
Thaspium aureum Nutt.
**Pastinaca sativa* L.
**Anethum graveolens* L.
Heracleum lanatum Michx.
Conioselinum chinense (L.) BSP.
Angelica atropurpurea L.
**Daucus Carota* L.

CORNACEAE

Cornus canadensis L.
C. rugosa Lam. (*C. circinata* L'Her.)
C. Amomum Mill.
C. stolonifera Michx.
C. candidissima Marsh. (*C. paniculata* L'Her.)
C. alternifolia L. f.

ERICACEAE

Chimaphila umbellata (L.) Nutt.
Pyrola secunda L.
P. chlorantha Sw.
P. elliptica Nutt.
P. rotundifolia L., var. *americana* (Sweet) Fernald. (*P. americana* Sw)
P. asarifolia Michx.
P. asarifolia Michx., var. *incarnata* (Fisch.) Fernald.
Monotropa uniflora L.
M. Hypopitys L.
Ledum groenlandicum Oeder.
Kalmia polifolia Wang.
Andromeda polifolia L.
A. glaucophylla Link.
Chamaedaphne calyculata (L.) Moench.
Gaultheria procumbens L.
Chiogenes hispidula (L.) T. & G.
Gaylussacia baccata (Wang.) C. Koch.
Vaccinium pennsylvanicum Lam.
V. canadense Kalm.
V. corymbosum L.
V. Oxycoccos L.

PRIMULACEAE

Primula mistassinica Michx.
**Lysimachia punstata* L.
L. terrestris (L.) BSP.
**L. Nummularia* L.
L. thyrsiflora L.
Steironema ciliatum (L.) Raf.
Trientalis borealis Raf. (*T. americana* (Pers.) Pursh.
**Anagallis arvensis* L.

OLEACEAE

Fraxinus americana L.
F. pennsylvanica Marsh.
F. pennsylvanica Marsh., var. *lanceolata* (Borkh.) Sarg.
F. quadrangulata Michx.
F. nigra Marsh.
**Syringa vulgaris* L.
**Ligustrum vulgare* L.

GENTIANACEAE

Gentiana crinita Froel.
G. Andrewsii Griseb.
Halenia deflexa (Sm.) Griseb.
Menyanthes trifoliata L.

APOCYNACEAE

**Vinca minor* L.
Apocynum androsaemifolium L.
A. cannabinum L.

ASCLEPIADACEAE

Asclepias incarnata L.
A. syriaca L.
A. phytolaccoides Pursh.
Acerates viridiflora Ell.

CONVOLVULACEAE

Convolvulus spithamaeus L.
C. sepium L.
**C. arvensis* L.
Cuscuta pentagona Engelm. (*C. arvensis* Beyrich)

POLEMONIACEAE

Phlox paniculata L.
P. divaricata L.
P. subulata L.
**Polemonium reptans* L.

HYDROPHYLLACEAE

Hydrophyllum virginianum L.

BORAGINACEAE

**Cynoglossum officinale* L.
Lappula virginiana (L.) Greene.
**L. echinata* Gilibert.
**Symphytum officinale* L.
**Lycopsis arvensis* L.
**Myosotis scorpioides* L.
M. laxa Lehm.
M. arvensis (L.) Hill.
**M. versicolor* (Pers.) Sm.
**M. micrantha* Pallas.
M. virginica (L.) BSP.
**Lithospermum arvense* L.
**Echium vulgare* L.

VERBENACEAE

Verbena urticaefolia L.
V. hastata L.

LABIATAE

**Ajuga genevensis* L.
Scutellaria lateriflora L.
S. epilobiifolia Hamilton. (*S. galericulata* L.)
**Marrubium vulgare* L.
**Nepeta Cataria* L.
**N. hederacea* (L.) Trevisan.
Dracocephalum parviflorum Nutt.
Prunella vulgaris L.
Physostegia virginiana (L.) Benth.
**Galeopsis Tetrahit* L., var. *bifida* (Boenn.) Lej. & Court. (*G. Tetrahit* L.)
**Lamium amplexicaule* L.
**L. maculatum* L.
**Leonurus Cardiaca* L.
Stachys tenuifolia Willd., var. *aspera* (Michx.) Fernald.
S. palustris L.
†*S. germanica* L.
**Salvia Sclarea* L.
S. nemorosa Crantz.
Monarda didyma L.
Hedeoma pulegioides (L.) Pers.
**Satureja Acinos* (L.) Scheele.
S. vulgaris (L.) Fritsch.
**Hyssopus officinalis* L.
**Thymus Serpyllum* L.
Lycopus virginicus L.
L. uniflorus Michx.
**L. europaeus* L.
L. americanus Muhl.
**Mentha piperita* L.
M. arvensis L.
M. arvensis L. var. *canadensis* (L.) Briquet.
Collinsonia canadensis L.
**Origanum vulgare* L.

(To be Continued)

†Guelph is one of the few stations in North America for this plant. According to T. J. Moore, (Ontario Natural Science Bulletin 2: 47, 1906): "It was first observed near the stables at the Ontario Agricultural College in 1895 by Prof. M. W. Doherty, and was first recorded in the appendix to Vol. III of Britton and Brown's 'Illustrated Flora' published in 1898." P. C. Standley, Rhodora 22: 128, 1920, reported the species as growing "on ballast in the eastern United States" and H. Groh, Can. Field-Nat. 39: 84-85, 1925, reported it from the shore of Mink Lake, between Douglas and Eganville, Ontario.

BOOK REVIEWS

FLEMING MEMORIAL PAPERS, *The Brodie Club, November* 5, 1940.

This is a 30-page duplicated copy of the Proceedings of the Fleming Memorial Meeting of the Club, which was held under the chairmanship of Professor A. F. Coventry. Mr. L. L. Snyder presented an account of Mr. Fleming's life, 1872-1942; Mr. E. G. McDougall gave a paper on "The Fleming Library"; an account of "The Journals" of J. H. Fleming, 1888-1940, was presented by Mr. Jas. L. Baillie; Mr. T. H. Shortt read a paper on "The Fleming Collection"; Mr Fleming's relations with the Brodie Club were discussed in detail by Mr. R. J. Rutter; and finally the chairman presented Mr. P. A. Taverner's paper "The Old Taxidermy Shop and Point Pelee Days".

The whole publication has been read feelingly, for he was a firm friend of mine ever since we first met *in the field* at Point Pelee in 1914, at which time I had been fairly actively engaged in ornithological studies at Toronto for eleven years. This very special tribute by the Brodie Club to one who followed ornithology so assiduously at

a time when very little attention was paid to this field, and who accomplished great things by doing so, should be read by every Canadian naturalist. The biography of Fleming is an inspiration, especially to those who feel they are working alone. He worked almost alone and kept interest alive through a period of years during which a lack of interest in this subject prevailed in his native City, which is almost impossible for those who live there to-day to comprehend. Canada, and particularly Canadian ornithology, owes a debt of gratitude to the late J. H. Fleming.—H.L.

CONSERVATION IN THE UNITED STATES *by members of the Faculty of Cornell University;—A. F. Gustafson, H. Ries, C. H. Guise, W. J. Hamilton, Jr., Comstock Publishing Company. Inc., Ithaca, New York,* 445 *pp.,* 1939, *Price* $3.00.

This very readable, well-illustrated text-book tells about conservation under four main headings: Soil and water resources; Forests, parks and grazing lands; Wildlife; and Mineral resources. It thus covers a great deal of territory and does it well. Each of the chief sections concludes with a series of questions, there being seventy-one at the end of the part on soil.

Canada has to face the same basic problems in conservation that have arisen in the United States, and to get a good sane view of the whole question any Canadian professor, student, or layman will profit by reading this work by four Professors of Cornell. A quotation from the introduction gives the main idea:

"A great need of our nation to-day is the development by the individual citizen of a consciousness of the definite necessity for the conservation of our natural resources."—H.L.

THE VERTEBRATE FAUNA OF DARLINGTON TOWNSHIP, DURHAM COUNTY, ONTARIO,—*by A. E. Allin, Trans. Royal Canadian Institute, Vol.* 23, *Pt.* 1, *October,* 1940, *pp.* 83-118.

The very fact that this list includes all the vertebrates known to inhabit a small area in Ontario makes it especially interesting and valuable. Faunal lists often get no farther down than birds. In this case, indicating perhaps a special interest of the author, not only are the inland fishes of Darlington included, but also those recorded locally from Lake Ontario. Listed are 32 species of mammals, 171 of birds, 13 of amphibians, 8 of reptiles and 45 of fishes. No pains have been spared to make the list complete and accurate, which means that the author has not merely compiled his own observations and those of others, but has digested them as well.—C.H.D.C.

HUNTING THE WHITE-TAILED DEER, *by Dr. B. F. Ederer, pocket size, pp.* 1-80 *University of Minnesota press, Minneapolis,* 1940. *Price* $1.00.

In parts of the United States and Canada the population of deer is so large that management is a problem and hunting need never affect the deer adversely. A skilful chase or stalk, a clean kill and properly dressed game are the marks of a respectable and creditable hunt. Too often deer hunting never rises above the mutilation, fatal or otherwise, of a beautiful animal. The reviewer was reminded by Dr. Ederer's booklet of the admiration inspired in him by the sight of Eskimo hunters dressing out a caribou. It was obvious that centuries of tradition governed every cut. Dr. Ederer seeks to bring modern deer hunters into the traditions of Daniel Boone and the mediaeval "Master of the Hunt."—C. H. D. C.

ANNUAL REPORT OF THE PROVANCHER SOCIETY, 1940. *Illustrated,* 88 *pp.*

The latest report of this distinguished Canadian society includes: an article by Dr. R. M. Anderson recording the addition of two species of bats to the list of Quebec mammals; the returns for bird-banding on Iles-Razades, by Dr. D. A. Dery; the diary of the Guardian of the society's islands; and an interesting description of the society's bird sanctuary at Ile-aux-Basques and Iles Razades.—EDITOR.

LIVING TREASURE *by Ivan T. Sanderson,* 8 *vo., pp.* 290, 32 *illustrations by the author,* 1941. *The Macmillan Co. of Canada Ltd., Toronto, Price* $4.25.

Living Treasure is an extremely colourful account of zoological collecting in Jamaica, Haiti,

British Honduras and Yucatan. It follows the style of the author's previous works, which were severely criticized by thoroughly competent zoologists. There is an atmosphere of hyperbole that will put any scientifically trained reader in a critical mood. Suffice it to say that the author makes the most of the dramatic possibilities of his narrative. Since he states that he does not take himself seriously we can recommend *Living Treasure* as an entertaining and well-written book, not to be taken seriously.

It is in the accompanying illustrations that Sanderson's real ability is shown. His drawings accomplish, through their accuracy and magnificent composition, a simple and yet entirely adequate presentation of their subjects.—C.H.D.C.

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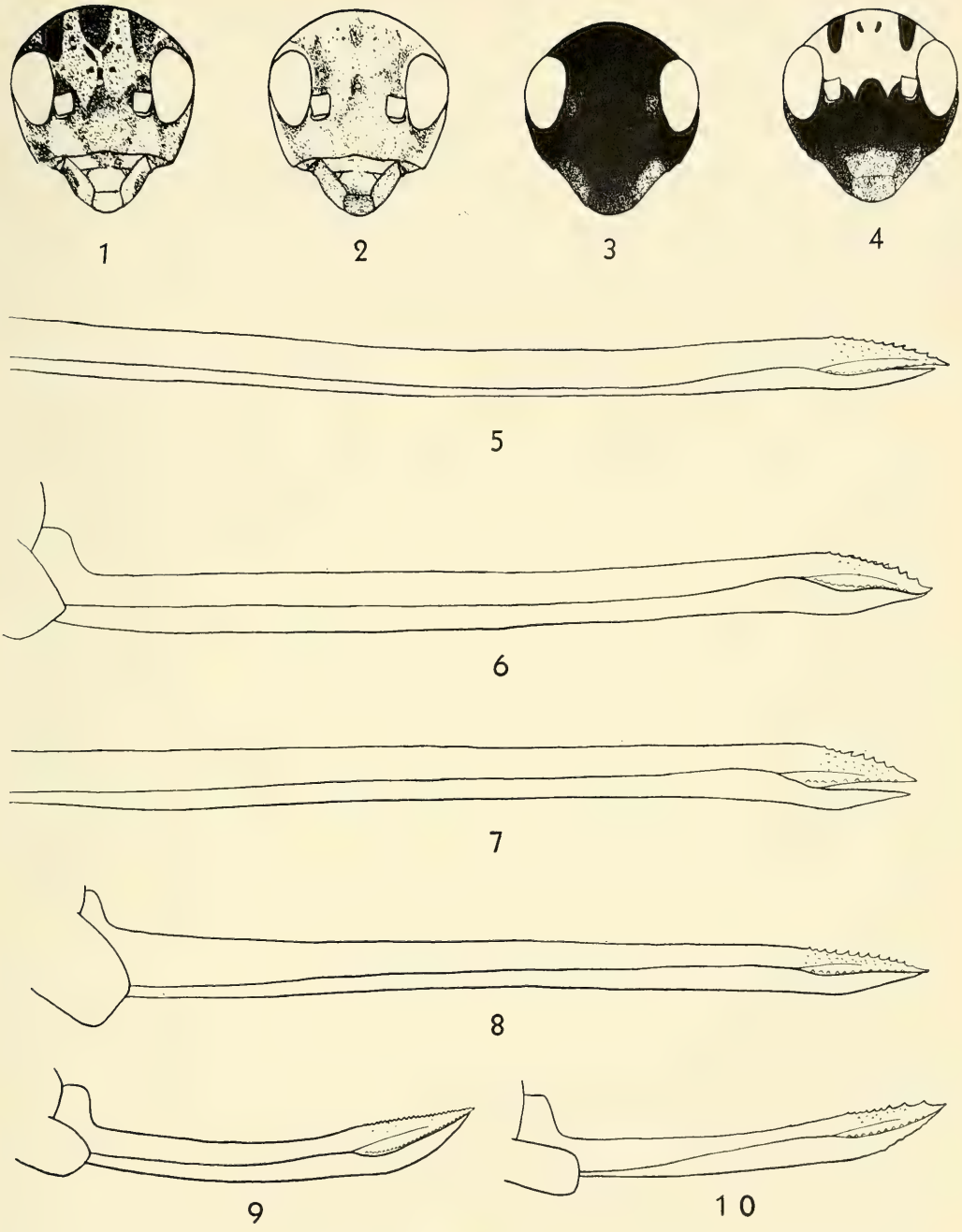

PLATE I.

Figure 1. Colour pattern of face of *Nemobius fasciatus fasciatus.*
Figure 2. Colour pattern of face of *Nemobius maculatus.*
Figure 3. Colour pattern of face of *Nemobius carolinus carolinus.*
Figure 4. Colour pattern of face of *Nemobius griseus griseus.*
Figure 5. Ovipositor of *Nemobius fasciatus fasciatus.*
Figure 6. Ovipositor of *Nemobius fasciatus abortivus.*
Figure 7. Ovipositor of *Nemobius griseus griseus.*
Figure 8. Ovipositor of *Nemobius maculatus.*
Figure 9. Ovipositor of *Nemobius cubensis palustris.*
Figure 10. Ovipositor of *Nemobius carolinus carolinus.*

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PLATE II.

Outline maps indicating the probable distribution in Ontario of the various species of *Nemobius*.

Figure 11. *Nemobius carolinus carolinus.*

Figure 12. *Nemobius cubensis palustris.*

Figure 13. *Nemobius maculatus.*

Figure 14. *Nemobius griseus griseus.*

Figure 15. *Nemobius fasciatus socius.*

Figure 16. *Nemobus fasciatus fasciatus.*

Figure 17. *Nemobius fasciatus abortivus.*

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The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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*TRIASSIC STRATIGRAPHY, MAHAFFY CLIFFS TO RED ROCK SPUR, PEACE RIVER FOOTHILLS, B.C.**

35,343

By F. H. McLEARN

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ON THE north side of the Peace valley, from Mahaffy Cliffs to Red Rock spur, only the Triassic Schooler Creek formation out-crops. Some interesting sections are exposed, recording the presence of a number of well defined faunal zones both in the Grey and Pardonet members. In the following pages there is first a short description of the geography. This is followed by a discussion of the faunal zones and their correlation.

Acknowledgement is made to several assistants, who at various times have aided in the collection of fossils or in surveying. They are A. H. Bell, R. A. C. Brown, A. J. Childerhose, W. Jewitt, A. B. McLay and C. R. Stelck. The late F. A. Kerr made the topographic base map. An acknowledgement is also made to Dr. R. T. D. Wickenden with whom the origin of the Dry canyon has been discussed.

Geography

A description of the geography of the Peace River foothills has been recently given[1], and need not be repeated here. Some familiarity with the local topography, however, is necessary, if the location of faunal zones is to be accurately recorded. A few new geographic names are proposed. It is not intended, however, that they should necessarily become permanently adopted by the local settlers or by geographers.

The curved, projecting ledges of Folded hill make it a conspicuous landmark on the north side of the Peace valley, below Tepee Rocks and a little more than two miles west of the mouth of Schooler Creek. To the east of this and at the west border of the area, herein described, are the Mahaffy cliffs (see map) with their rocky ledges sloping gently to the southeast. They rise above the remnants of some high sand and gravel terraces which are separated from the river bank by a broad low flat. A small stream crosses the flat and cuts through the terrace remnants. The strata exposed in the stream bed and cliffs form a section at least 600 feet thick.

Kerr spur is a high, narrow ridge extending southeasterly from a high and massive hill west of Schooler Creek. The southwest side is fairly steep and has many rocky ledges sloping southeasterly. The Schooler valley is wide and has, on its lower slopes, massive terraces carved out of sand and gravel. A few ledges appear along the stream channel. On the east side of Schooler valley, and about two miles above its confluence with the main valley, is the high Stelck ridge. Sand and gravel extend to the top of this ridge and there are remnants of high terraces with long, steep faces. Bedrock is mostly concealed, but on the south side, which slopes down into Stelck coulee, there are exposed ledges of rock in places.

Schooler hill and the Dry Canyon shoulder also lie on the east side of the Schooler valley.

The Dry Canyon shoulder is a westward projecting buttress from Schooler hill. On the south side fronting the Peace valley there are rocky ledges in the canyon, cut out of solid rock. The now dry canyon, about 900 feet long and about 200 feet deep, must have been a striking feature of an earlier landscape, for at one time there was, at the head of it, a waterfall with a drop of about 150 feet. The river then stood about 500 feet higher than now. As one theory of origin, it is inferred that in late Pleistocene time, a stream from the north debouched on the main valley at this site and that the Schooler valley was filled with ice, sand and gravel to a height

* Published with the permission of the Director, Mines and Geology branch, Department Mines and Resources, Ottawa.

1. Trans. Roy Soc. Canada., 3rd ser. sec. 4, vol. 34, p.p. 63-66.

above that of the canyon. In cutting down through the fluvioglacial fill of sand and gravel the stream soon encountered the solid rock of this shoulder and slowly excavated the canyon. This situation could not be permanent, however, because of the slow erosion in the solid rock. Excavation proceeded more rapidly in the center of the preglacial valley to the west with the melting of the ice and with the more rapid erosion of the unconsolidated sand and gravel fill. As another theory of origin, it can be inferred that the stream piracy took place in preglacial and later Tertiary time. A Tertiary stream on this site might have lost its headwaters to another stream excavating more rapidly in the center of the syncline on the site of the present Schooler valley.

Schooler hill is east of Schooler creek and between Stelck coulee and the main Peace valley. There are ledges of rock at the south end of the hill from just above the packtrail nearly up to the top of the hill. There are also a few ledges on the west slope and at the north end where this hill slopes down into Stelck coulee.

Jewitt spur is east of Schooler hill. A number of ledges mark the south end where they project through sand and gravel on the steep faces of high terrace remnants. There is also a ledge in the bank of the river just east of the Jewitt fault.

Childerhose coulee is, in its lower stretch, a deep, narrow ravine in which a small stream flows. Some steep ledges of rock appear in this part. At a much higher elevation, and above the 400 foot terrace the coulee is broad and shallow, but several ledges of rock occur on the sides of this valley.

The south face of McLay spur is, near the top, a low, steep cliff which overlooks a steep, shallow, partly wooded, talus covered gully. Below, a prominent ledge is ice or water worn and partly undercut. Below this is a talus covered, partly grassy slope, with protruding ledges. From the base of this slope to the river bank is a broad, low flat. The east face of McLay spur is long, high and very steep and has massive, southwest dipping ledges.

Bell spur is east of McLay spur and is truncated at its south-eastern end by a cliff which exposes, in profile, long, thick and sloping ledges. The lower part of this face is concealed by the sand and gravel of a high terrace. Rock is also exposed on the top of this spur, which slopes southwesterly at a low angle, like the underlying rock. The conformation of this surface to the structure is not perfect and from south to north the surface either rises gradually across the strata or, in places, abruptly, stepping up in higher and higher sloping shelves of rock.

The westerly dipping ledges of Red Rock spur, east of Bell spur, are perched above a high terrace, north of Black Rock whirlpool. The west slope of this spur approximately conforms to the dip of the underlying rock. At river level a long ledge of rock projects from the shore out into the river channel and diverts the course of the current out from the shore. As a result, a large sand bar has formed in the middle of the stream channel and a whirlpool on the downstream side of the ledge. This, the Black Rock whirlpool, is dangerous to navigation and must be avoided by boats and canoes.

STRATIGRAPHY

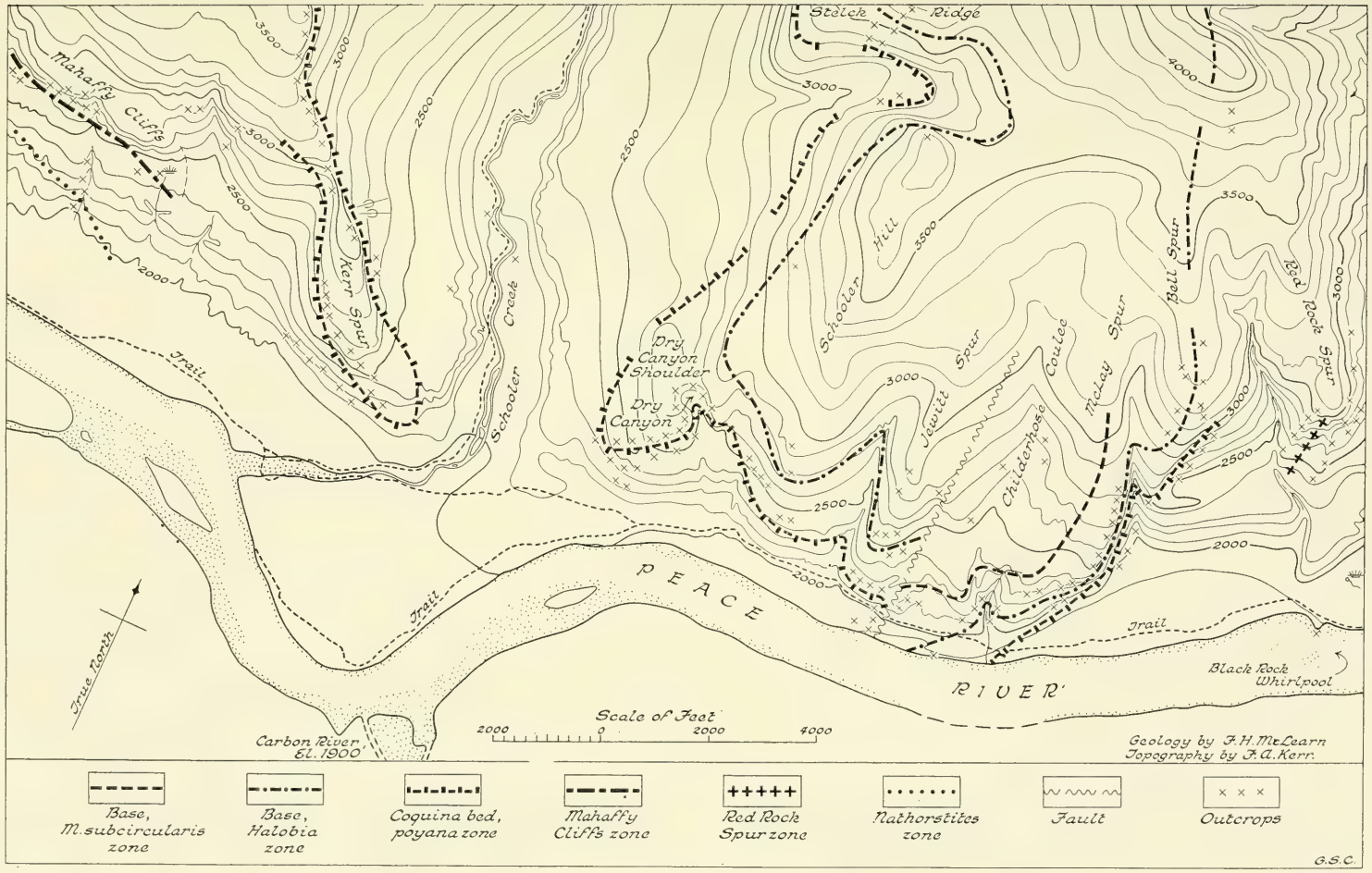
The Triassic stratigraphy of the Peace River foothills has been described in several papers and this is a further contribution. Both the lower or Grey and the upper or Pardonet members of the Triassic Schooler Creek formation are known in the area between Mahaffy cliffs and Red Rock spur. The following faunal zones can be recognized:

Monotis subcircularis zone
Halobia zone
Lima? (*Mysidioptera?*) *poyana* zone
Mahaffy Cliffs zone
Red Rock Spur zone.
Nathorstites zone

The uppermost two zones are in the Pardonet member and the remaining four zones are in the Grey member. The base of the formation is not present in this area and has not been located in any part of the Peace River foothills. The lowest beds in this area are those of the *Nathorstites* zone, well down in the Grey member.

Beds of the *Nathorstites* zone occur on the stream bed below Mahaffy cliffs, where they consist of impure, grey limestone and grey, calcareous sandstone with *Coenothyris* ? sp., *Daonella nitanae* (cf. *D. lommeli*), *Myophoria* (*Elegantinia*) cf. *urd* Boehm and *Nathorstites* cf. *mcconnelli* var *lenticularis* Whiteaves. Elsewhere, from Kerr to Red Rock spur this zone lies below river level The *Nathorstites* fauna has been dated Ladinian, i.e. later Meso-Triassic or at the latest very early Karnian, i.e. very early Neo-Triassic.

Above the Nathorstites-bearing beds, in the stream below the Mahaffy cliffs, are brachiopods



DESCRIPTION OF MAP

Faunal zones of the Triassic Schooler Creek formation on the north side of the Peace River valley, from Mahaffy cliffs to Red Rock spur, Peace River foothills, B.C. A structure section across this map has been recently published (McLearn, F.H., *Trans. Roy. Soc. Can.*, 3rd ser., sec. 4, vol. 34, 1940, p. 73) from just east of folded belt, near A, to B. The coquina bed on Kerr spur has not been located. Its approximate horizon in the *poyana* zone has been mapped.

DESCRIPTION OF PLATE

Above. Red Rock spur.
Below. South end of McLay spur.

of the *Nathorstites* zone including *Coenothyris?* and *Spiriferina* and in addition a species of *Lingula*. This recalls the similar situation at Beattie hill and other localities where the brachiopods and some pelecypods of the *Nathorstites* zone persist higher stratigraphically than the *Nathorstites* and other ammonoids and are associated with *Lingula*.

Above, and in the same stream bed, are nearly 400 feet of mostly nonfossiliferous, grey limestones, siltstones and fine sandstones.

Yet higher and in the ledges of the Mahaffy cliffs are grey, greenish grey, buff and yellowish weathering, impure limestones, calcareous siltstones, very fine sandstones and rare, calcareous, coarse sandstones. A sample, tested, of impure limestone yielded 3 per cent insoluble matter, a sample of sandy limestone, 40 percent, and a sample of calcareous siltstone, 60 per cent. Numerous, poorly preserved pelecypods were collected, including the following: *Gervillia* sp., *Mytiloperna?* sp., *Pecten chiwanae, Lima* (*Limatula*) *childerhosei* var. ?, *Lima* cf. *striata* var. *lineata* Schlotheim, *Ostrea* sp., *Myophoria* (*Tropiphora*) cf. *laevigata* Ziethen, *Myophoria* (*Tropiphora*) cf. *ovata* Goldfuss and *Myoconcha amnipacis*. Similar beds occur in the upper part of Mahaffy coulee. This Mahaffy Cliffs pelecypod fauna is interesting because of the resemblance of some species to those in the German Triassic. Muller and Ferguson record *Myophoria* cf. *laevigata* from the Grantsville formation of Nevada which they correlate with the Anisian or early Meso-Triassic of Europe. As it does not seem possible that the *Nathorstites* fauna can be correlated with anything earlier than the Ladinian or later Meso-Triassic of Europe, the Mahaffy Cliffs fauna cannot be earlier than Ladinian.

The beds on Red Rock spur must lie at about the same horizon and be of about the same age as those on Mahaffy cliffs. The east and west ledges of this spur and the talus slope between them contain grey, impure limestone, calcareous siltstone and sandstone, weathering grey, yellowish and reddish. They contain the brachiopod *Spiriferina* and numerous, but poorly preserved, pelecypods, including *Mytiloperna* ? sp., *Myophoria* (*Tropiphora*) cf. *laevigata* Ziethen, *M.* (*Tropiphora*) cf. *laevigata* var. *elongata* Philippi, *Lima* cf. *striata* var. *lineata* Schlotheim and *Modiola ahsisi* var. Some of these species are like those in the Mahaffy cliffs and have a similar significance. A tentative correlation of the Red Rock Spur, Mahaffy Cliffs and *Nathorstites* faunas with the *Ladinian* or later Meso-Triassic of Europe is all that can be attempted just now. For some time the writer has been dating the *Nathorstites* fauna as *Ladinian* or, at the best, very early Karnian as compared with Europe.

Between the Mahaffy Cliffs and Red Rock Spur faunal zones, below, and the *poyana* zone above, are grey calcareous sandstones, siltstones and limestones, mostly barren of fossils. They occur in some high ledges between Mahaffy cliffs and Kerr spur, in the lowest ledges of the Dry Canyon shoulder and Schooler hill, are concealed below the terrace sands and gravels west of the Jewitt fault on Jewitt spur, but occur again on the lower slopes at the south east end of Bell spur and in the lower part of the gully between Bell and Red Rock spurs. Near the top of these beds, just below the *poyana* zone and on the second lowest ledge on the Dry Canyon shoulder, west of the Dry Canyon, there are calcareous, somewhat slabby, coarse siltstones with poorly preserved *Lingula*. At a similar horizon in a ledge below the cliff at the southeast end of Bell spur, there is calcareous fine sandstone with *Lingula*. There is no *Lingula* zone, but up to the present this genus has been collected only from beds just above the *Nathorstites* zone and from below the *poyana* zone.

The *Lima?* (*Mysidioptera?*) *poyana* zone is present on all of hills and spurs between Kerr and Bell spurs, except for a short distance east of the Jewitt fault, where it is below river level. It, however, rises to the east and occupies the middle ledges of McLay spur and the base of the high cliff on Bell spur. Between the Dry Canyon shoulder and Bell spur the *poyana* zone includes a bed of coquina limestone which is easily recognized and characteristic of the zone. It consists almost entirely of shells, both whole and broken. The exact limits of this zone are not well defined. The coquina bed is, very approximately, 1,000 feet above the top of the Red Rock Spur zone and, very approximately, 1,600 feet above the *Nathorstites* zone.

The highest of a lower group of ledges on the southwest flank of Kerr spur contains beds with *"Terebratula"* cf. *julica* Bittner. Above this, a rather prominent, continuous and not very thick ledge of grey limestone and calcareous siltstone is practically barren of fossils. Just above it however are discontinuous ledges of fossiliferous, grey limestone with *Pinna* sp., *Pecten? dishinni* var. *kaska, Lima?* (*Mysidiop-*

tera?) *poyana* and *Pteria* sp. *Lima poyana* was also collected farther up the hill, in the 'notch'. On the east side of the Schooler valley and on the lower, southern slope of Stelck ridge are ledges of grey limestone and calcareous, fine sandstone with poorly preserved fossils, which lie at about the horizon of the poyana zone. The outcrop of this zone should descend slowly down the west slope of Schooler hill, although it is not known to be exposed.

The *poyana* zone appears in the sloping ledges on the southeast face of the Dry Canyon shoulder, just west of the canyon. A long, unbroken ledge, above the ledge with *Lingula,* consists of grey limestone and calcareous siltstone and contains *'Terebratula'* cf. *julica* Bittner, *Pinna* sp., *Pteria? collipiana, Alectryonia* cf. *montiscaprilis* Klipstein, *Myophoria silentiana* var., *Pecten? dishinni* and *Lima? (Mysidioptera?) poyana.* A higher, small ledge consists of grey limestone. A yet higher and prominent ledge, with a broad, flat top and steep front, consists of grey, calcareous siltstone, calcareous, fine sandstone, limestone and the coquina limestone bed. The following were collected from this ledge: *Myophoria morigera, M. silentiana, M. silentiana* var. *placidus* and *Pecten? dishinni.* In addition the following were collected from talus from the second and fourth ledges: *Myophoria silentiana* var. *schooleri, Myphoria (Elegantinia)* cf. *margaritifera* Boehm? and *Pecten? dishinni* var. *kaska.*

On the southwest flank of the south end of Schooler hill and above the high ledge which is just above the high terrace and pack-trail, are small ledges of grey limestone and calcareous siltstone. The lowest of these small ledges contains *Lima ? poyana* and *'Terebratula'* cf. *julica* Bittner.

Exposures of the *poyana* zone reappear at the south end of Jewitt spur in a long, thick ledge and in the nearly vertical beds in the dragfold on the west side of the Jewitt fault. All of these exposures are just above a terrace and above the packtrail. At the west end of the ledge and below the coquina bed are grey limestones and calcareous siltstones with *Pecten? dishinni* and other shells. At the east end of this long ledge and at its base is the coquina bed. Above this bed are grey limestone and calcareous, very fine sandstone with *'Terebratula'* cf. *julica* Bittner, and *Lima? (Mysidioptera?) poyana.* The coquina limestone, other limestone beds and calcareous fine sandstones are included in the nearly vertical beds adjacent to the Jewitt fault. The *poyana* zone is below river level for some distance east of the fault.

On the south face of McLay spur, the *poyana* zone is found in ledges low on the grassy talus slope. Here are grey, crystalline, limestone, partly recrystallized, crinoidal limestone, the bed of 'coquina' limestone, calcareous siltstone and some very fine calcareous sandstone. The 'coquina' bed contains *Myophoria silentiana* var. *schooleri* and *Pecten? dishinni.* Other and adjacent beds of this *poyana* zone contain *'Terebratula'* cf. *julica* Bittner, *Pteria? collipiana, Alectryonia* cf. *montis-caprilis* Klipstein and *Lima? (Mysidioptera?) poyana.*

The coquina and associated beds of the *poyana* zone, which occupy the lowest ledges on the southern face, rise to the northeast along the east face of McLay spur to occupy the middle ledges there. Near the southern end of this face the 'coquina' bed is about 5 feet thick and is interbedded with a second, thin coquina bed, dark, impure limestones and calcareous, fine sandstones. The following species were collected from the 'coquina' bed: *Myophoria silentiana* var., *Myophoria (Elegantinia)* cf. *margaritifera* Boehm?, *Pecten? dishinni* and *Pleurophorus kissoumi.* The following pelecypods were collected about 25 feet below the 'coquina' bed: *"Terebratula"* cf. *julica* Bittner, *Pinna* sp., *Alectryonia* sp. and *Lima? poyana.*

At the south end of Bell spur the beds of the *poyana* zone occur in the lower part of the cliff where there are ledges of grey. crystalline limestone, the grey, 'coquina' limestone, grey, partly crystalline and partly crinoidal limestone, impure, silty limestone and calcareous siltstone. A few beds contain scattered geodes lined with large and small crystals of calcite. *Lima? poyana* is present.

The *poyana* fauna, as now known, includes: *'Terebratula'* cf. *julica* Bittner, *Pinna* sp., *Pteria? collipiana, Alectryonia* cf. *montis-caprilis* Klipstein, *Myophoia silentiana, M. silentiana* var. *placidus, M. silentiana* var. *schooleri, Myophoria morigera, M. (Elegantiania)* cf. *margaritifera* Boehm ?, *Pecten ? dishinni, P. ? dishinni* var. *kaska, Lima ? (Mysidioptera ?) poyana* and *Pleurophorus kissoumi.* This fauna is correlated with the Karnian and earlier Neo-Triassic of Europe. It is probably also to be correlated with a part of the Luning formation of Nevada. Muller and Ferguson report *'Terebratula' julica* and *Alectryonia montis-caprilis* from that formation.

Between the *poyana*-bearing beds and the base of the *Halobia* zone in the Pardonet member are about 300 feet of rather sparingly fossiliferous, grey and dark grey limestones, calcareous siltstones and calcareous, very fine sandstones. They are in the top of the Grey member and more or less transitional to the characteristically dark and rather carbonaceous beds of the Pardonet member. On the Dry Canyon shoulder they include light and dark grey limestones and calcareous siltstones on the highest part of the shoulder and in the walls of the canyon. On the south face of McLay spur directly over the ledges with the *poyana* fauna are ledges of grey, partly dark grey, crystalline limestone, shelly limestone, crinoidal ? limestone and calcareous siltstone. Higher in the waterworn ledge are massive, impure, partly shelly limestone and calcareous siltstone. Higher and in the lowest exposure ledge in the steep shallow gully is dark, carbonaceous, calcareous siltstone at or very close to the base of the Pardonet member. On Bell spur the *poyana* beds are over-lain by grey limestones and calcareous, fine sandstones, which outcrop in the highest ledges in the cliff and also back from the cliff for some distance, on the top of the spur. Some of these highest beds carry a small, smooth brachiopod.

The *Halobia* zone in the lower part of the Pardonet member is present on Stelck ridge and in all the spurs and hills on the north side of the valley from Schooler hill to Bell spur. Ledges with beds of the *Halobia* zone are exposed on the south slope of Stelck ridge at a fairly high elevation. They contain *Halobia pacalis, Gryphaea chakii, Lima napii, Pleuromya* ? *nidovana, Juvavites* cf. *mackenzii, J.* cf. *bococki* and *Malayites.*

At the south end of Schooler hill, above the ledges of the *poyana* zone and in a high ledge, visible for a long way from both up and down the river ,are the basal dark beds of the *Halobia* zone with *Halobia* and *Gryphaea.* Much higher, much farther north and on the west side of the hill, is a small exposure of dark beds of the *Halobia* zone with *Oxytoma* cf. *mucronata* Gabb and *Discotropites* ? sp. Still farther north, at the end of this hill, where a steep descent begins into the upper part of Stelck coulee, are beds of the same member with *Halobia* sp., *Monotis alaskana* var. and *Helictites* ? sp. Thus the whole upper part of the hill is underlain by beds of the *Halobia* zone of the Pardonet member.

At the south end of Jewitt spur, west of the fault and about 600 feet above river level and much higher than the long ledge with beds of *poyana* zone, are nearly flat-lying dark limestones and calcareous siltstones. They are at about the base of the *Halobia* zone and contain *Halobia, Gryphaea, Pleuromya* and other fossils. Farther north, up the crest of Jewitt spur, *Halobia*-bearing beds occur in rare exposures to an elevation of more than 1,000 feet above river level. Elsewhere bed rock is concealed by sand and other superficial deposits. East of the fault and at a much lower elevation above the packtrail and between the Jewitt fault and Childerhose coulee a number of ledges protrude through the grassy slopes. From them the following have been collected: *Oxytoma* cf. *mucronata* Gabb, *Halobia* sp., *Gryphaea chakii, Pecten nihanianus, P. otianus, Pecten* (*Entolium*) sp. and *Modiolus ahsisi* var. *stelcki.*

The ledge on the river bank, just east of the Jewitt fault, consists of west dipping, dark grey, carbonaceous, impure limestone and siltstone with *Halobia* sp., *Gryphaea chakii* and *Pecten.* A single talus block of dark limestone, picked up on this ledge, yielded *Monotis ireneanas, Oxytoma* cf. *mucronata* Gabb, *Halobia pacalis, Lima napii, Pleuromya* ? *nidovana, Proclydonautilus* ? sp. *Juvavites* cf. *bococki, Malayites dawsoni, Miltites* ? sp., and *Discotropites* cf. *acutus* Mojsisovics. A second talus block picked up at the same locality yielded *Monotis ireneana, Oxytoma* cf. *mucronata* Gabb, *Halobia* sp., *Gryphaea chakii, Pecten* sp., *Lima napii, Pleuromya* ? *nidovana, Proclydonautilus* ? sp., and *Malayites dawsoni.* These two blocks are evidently not from the exposed ledge. It is possible that they have been brought up from the bed of the river by the ice.

In the ravine in the lower part of Childerhose coulee and on the east side, are ledges of the *Halobia* zone with *Oxytoma* cf. *mucronata* Gabb, *Halobia pacalis, Gryphaea chakii* and *Pleuromya* ? *nidovana.* At a somewhat higher elevation on the west side is a steep cliff of dark, calcareous siltstone and limestone with a similar fauna.

Between Childerhose creek and the south end of McLay spur is a long, westerly sloping ledge of *Halobia* limestone and shelly, calcareous siltstone with *Oxytoma* cf. *mucronata* Gabb, *Halobia* sp. and *Juvavites* cf. *angulatus* Diener. Either from this ledge or from high beds at the south end of McLay spur the following were collected

in 1920: *Oxytoma* cf. *mucronata* Gabb, *Halobia* sp., *Proclydonautilus* ? sp., *Drepanites rutherfordi*, *Lecanites* sp. and *Metacarnites* ? sp.

On the south face of McLay spur in the shallow gully below the cliff, is a ledge with dark grey, carbonaceous, rather fissile, *Halobia*-bearing limestone close to the base of the *Halobia* zone and about 300 feet stratigraphically above the *poyana* zone. Still higher beds of dark limestone and calcareous siltstone are exposed in the low cliff. The lowest beds in the cliff contain *Pteria* ? *laksel*, *Oxytoma* cf. *mucronata* Gabb, *Halobia pacalis*, *Gryphaea chakii*, *Pecten nihanianus*, *P. otianus*, *Pecten* (*Entolium*) sp., *Modiola ahsisi* var. *stelcki* and *Goniomys* sp. About 15 feet higher are similar beds with the same pelecypods and in addition poor specimens of *Juvavites*. A little higher are *Pecten* (*Entolium*) sp., *Lima* sp. and *Modiola ahsisi* var. *stelcki*. In the highest ledge *Pleuromya* ? *nidovana* was collected. A collection from this cliff, made in 1920, contains *Oxytoma* cf. *mucronata* Gabb, *Halobia pacalis*, *Gryphaea chakii*, *Pecten* (*Entolium*) sp., *Modiola ahsisi* var. *stelcki*, *Pleuromya* ? *nidovana*, *Juvavites mclayi* and *J.* (*Dimorphites* ?) *pardonetiensis*. In addition to the above pelecypods *Pecten* cf. *saccoi* Parona was collected in talus.

On the east face of McLay spur the *Halobia* beds occupy only the highest ledges.

The highest beds on Bell spur are of the *Halobia* zone. They occur in a sloping shelf or plate on the west slope of the spur and some considerable distance back from, or north of, the steep cliff.

In the *Halobia* zone between Schooler hill and Bell spur, ammonoids are rare. Pelecypods, however, are very common, including *Pteria* ? *laksel*, *Oxytoma* cf. *mucronata* Gabb, *Monotis* ? *ireneana*, *Halobia pacalis*, *Gryphaea chakii*, *Pecten nihanianus*, *P. otianus*, *P.* cf. *saccoi* Parona, *P.* (*Entolium*) sp., *Lima napii*, *Goniomya* sp., *Modiola ahsisi* var. *stelcki* and *Pleuromya* ? *nidovana* (cf. *Posidonia madisonensis* Smith). Because the ammonoids are rare and exposures are, on the whole, too incomplete it is not possible to divide the *Halobia* zone into subzones, based on amonoids, as has been done for the sections on Brown and Pardonet hills, farther west. There is evidence, however, that the *Halobia* zone between Schooler creek and Bell spur does cover the same range of ammonoid succession as at the more western localities. Thus the fauna collected on the higher part of the south slope of Stelck ridge, with *Juvavites* cf. *mackenzii*, *J.* cf. *bococki* and *Malayites*, the fauna collected in the loose blocks found lying on the ledge at river level just east of the Jewitt fault, with *Juvavites* cf. *bococki*, *Malayites dawsoni*, *Miltites* ? sp. and *Discotropites* cf. *acutus* Mojsisovics and the fauna from the south end of McLay spur, with *Juvavites mclayi*, *Juvavites* sp., and *J.* (*Dimorphites* ?) *pardonetiensis*, all probably represent the ammonoid *Stikinoceras-Styrites* fauna of more western sections. This ammonoid zone is correlated with the Karnian of Europe and also with a part of the Luning formation of Nevada. The collection made in 1930 from near the west end of McLay spur, with *Drepanites rutherfordi*, *Lecanites* sp. and *Metacarnites* ? sp., probably represents the *Drepanites* fauna of West Brown spur, which can be correlated with the Norian of Europe. The small fauna collected at the north end of Schooler hill, with *Monotis alaskana* Smith var. and *Helictites* ? sp. is to be compared with the highest beds of the *Distichites* zone on West Brown spur. This zone is correlated with the Norian of Europe. It is interesting to note that Crickmay records *Monotis alaskana* from just below the *M. subcircularis* zone at Parsons Bay, B.C.

The *Monotis subcircularis* fauna is known definitely only in the upper part of Childerhose coulee, east of the Jewitt fault, in this part of the foothills. Elsewhere in the foothills it is known on the west slope of Brown spur, on Pardonet hill, at *Rapide qui ne parle pas* and other localities. This fauna is correlated with the Norian or later Neo-Triassic of Europe.

The beds with *Drepanites*, *M. alaskana* var. and *M. subcircularis* can be correlated with a part, but not the highest part of the Gabbs formation of Nevada. It so happens however that there are no species in common with those recorded by Muller and Ferguson from the Gabbs.

The top of the Schooler Creek formation and the contact with the overlying Pine River shale have not been located between Mahaffy cliffs and Red Rock spur. No uppermost Triassic fauna, with *Pteria contorta* of Rhaetic age has yet been found in the Peace River foothills. The occurrence of this fauna in the top of the Gabbs formation in Nevada, where it has been found by Muller and Ferguson, is the only record of the Rhaetic in North America.

THE PECTORAL SANDPIPER IN SPRING

By W. E. SAUNDERS

STUDENTS of the waders in fall make an acquaintance with this species among their earliest experiences, but it took me many years of study before I happened on one in spring. My first spring discovery came on a canoe trip down the Thames River, when on April 2nd, 1915, I collected one on a small island near Ingersoll, Ontario. In that decade I saw a few flocks of close flying sandpipers at Kingsville which I felt sure were of this species, because no other wader of that size occurs in close flocks in April, but it was not until 1925 that we began to see them in spring at London. In that year they burst on our consciousness, and they were recorded four times between April 8th and 30th, and on two of these occasions they were in flocks of a hundred or more.

We missed them in 1926 but in 1927 and succeeding years they were found all over the district, including West Lorne by Mr. Lemon, and Mitchell and Galt by Mr. Patterson, the flocks varying in size up to two hundred. In 1927 all those seen were in May, lasting until the 10th, but usually, and after 1933, all of our records were in April. The occasional May records extended even until the 24th. In 1934 I recorded my last large flock which numbered 150.

Of late years there has been a gradual diminution in their numbers and I, personally, have not seen a spring bird since 1938, though our Club has recorded a few both in 1939 and 1940. Mr. A. A. Wood however has recently moved to Chatham and he is an addict of the fine marsh belonging to Mr. Bradley, near the mouth of the Thames River, where conditions are very favourable. He saw his first Pectoral at Amherstburg on April 29th, 1939. Then, he writes "in 1940 I got quite well acquainted with them at Bradley's; my notes show four on May 2nd; ten on May 10th; one on the 12th; five on the 14th, and six on the 15th. From those I had a nice series of six in my collection, the first taken of the species. The birds were feeding on the mud flats at the lakeshore. When they were still they were hard to see, blending well with their background unless you could get them with the water behind them. A Dowitcher was taken on May 22nd."

These figures from Mr. Wood really indicate scarcity and not abundance, as they are all in small numbers and the total is only 26, and that would have been considered a small flock in the early thirties near London. Time alone can tell if we shall see them increasing in the future.

My friend, the late J. H. Fleming, was incredulous about these remarkable occurrences as there was neither a specimen nor a record of this bird in spring at the Royal Ontario Museum, but our Bird Club includes in its membership many careful and accurate observers. It certainly is remarkable however that none have been observed near Toronto where many good men scour the country for unusual birds. When birds occur in flocks of several hundred they are less easy to find than if the same total number is spread around in little groups or singly, and it is possible that the Pectorals have banded into large groups and therefore we have missed them; but, more probably they are returning to us in smaller numbers. In Middlesex they frequent puddles on the farms, which spring puddles are quite evanescent, and vary from year to year; witness the puddle ten miles north of London where we once found a flock of six Black-bellied Plover in late May. That place has been fairly haunted since then, but of late we never see even the puddle, let alone the Plover. Returning to the Pectoral, let me again stress the difference between the habitats of spring and fall. At the latter time, when nearly everyone makes his first acquaintance with the species, they are found on open mud beside creeks and larger waters, but in spring, near London, the puddles beside which we find them have grassy edges, and in such places, waders with the motionless habits of the Pectoral are difficult to detect.

These notes on the Pectoral Sandpiper hint that changes are constantly taking place even today, and sometimes they are rapid. The Dickcissel in 1896 was common for only one year, though in that year it occurred from London to Ottawa; Leconte's Sparrow occurred near Toronto, breeding, for two years; Wilson's Phalarope has been breeding, though in diminishing numbers, at West Lorne, for nearly ten years; and Henslow's Sparrow, widespread in western Ontario though not detected until nearly the present century, has been abundant at times, and lately rather rare. Such incidents prompt the taking of full and accurate notes by all lovers of nature, so that these events may be recorded as they occur.

CHANGES IN THE SQUIRREL POPULATION OF CHARLOTTEVILLE TOWNSHIP, NORFOLK COUNTY, ONTARIO, 1898-1940

By MONROE LANDON

MY KNOWLEDGE of the squirrels of the forests started when I was about ten years old, about the end of the last century. Black powder was a favourite purchase with the boys at that time, and everybody who could obtain a gun went hunting. My weapon was a long-barrelled muzzle loader which had been remodelled from my grandfather's flintlock. After I had blown out the nipple from overloading, several times, my father deemed it wise to buy me a double-barrelled breech-loader at the age of twelve. Of course, the three fall months were most enticing and as the grouse were too quick for us, as a rule, we celebrated with the squirrels.

The type of forest was mature hardwood with a scattering of white pine; chestnut must have made up at least ten percent of the hardwoods, with plenty of hickories, oaks and butternut mixed through maples, ashes, beech, sassafras, etc. The chestnut tree was the feature of the region. After frosts came every country store had all available floor space covered with chestnuts. Although I have no statistics, I believe that much more than one thousand bushels of chestnuts were shipped out of Norfolk County annually. Individual trees in the open would bear a bushel of nuts. Farmers depended on chestnuts for a cash crop. So here was one reason why we had good squirrel shooting. I, along with the squirrels, have often enjoyed eating chestnuts gathered in the spring from among the leaves under chestnut trees. They were moist and sweet. Then there were plenty of hollow trees and nesting places but the squirrels seemed to enter into the sport and would run through the tree tops, forty to sixty feet from the ground, often for a quarter of a mile before they would deign to take advantage of a knot-hole in order to escape the bombardment. But faulty as our aim was, we seldom came home without a half dozen blacks apiece and squirrel pie was a common dish to us.

It is hard to compare the squirrel population of those days with that of the present time because there is very little suitable squirrel forest left. I estimate that during this period, one third of the squirrel woods has become tilled land, and of the remaining two thirds the greater part is slash or small growth, with the wooded areas isolated into smaller plots. From the squirrel point of view, they have lost 75% of their homes. Making a fair estimate of one black (or gray) squirrel per acre of suitable forest at present and one red squirrel per five acres (although this could be doubled for red squirrels in evergreen woods) there must have been in 1900 three black squirrels and five red squirrels per acre. The red squirrels seemed to persecute the blacks. Then the red squirrels began to lessen in number and the blacks increase possibly twenty percent in both cases by 1910. I distinctly remember counting twenty-two black squirrels at one time while standing in the woods. I cannot account for the decrease of red squirrels unless life was too easy for them, because nobody would waste powder on them and food was plentiful. By 1920 there were still plenty of nuts, the forests were somewhat destroyed but blacks would rate about two and a half per acre and red squirrels, one. By 1930, both chestnuts and forests were decidedly curtailed and the black squirrel population cut in half. For several years it was a rare sight to see a red squirrel. Since then the black squirrel has remained about the same but the red squirrel has come back somewhat although not nearly as plentiful as the black. These remarks do not apply to urban areas where the black has been pampered in parks beyond reason. Not only are they pests but they are discouraging to nesting birds. Because in the early part of the period, the black squirrel was twice as plentiful as the gray, the two classes were customarily referred to as "blacks" and this custom still persists with the older generation although at present the ratio is reversed.

The status of the flying squirrel does not appear to have changed greatly. They never were very plentiful during the period, not nearly as plentiful as farther north, and because of their nocturnal habits, seldom observed during the day. Judging from their occurrence at the falling of nesting trees, their population seems to have dwindled in direct ratio with suitable types of mature forests.

The chipmunk never seemed very plentiful in the woods and is a rare sight now anywhere in this region. It used to be quite plentiful along the stump fences that were grown in with hazel,

but the modern wire fence gives no encouragement to the chipmunks. Apart from the puzzling decrease of red squirrels around 1915, the main factors in squirrel welfare seem to be the cutting away of the forests and the chestnut blight. Lack of food and lack of protection from both gun and natural enemies was thus aggravated. Enforcement of game laws had evidently favoured the squirrels during the last two decades but at the same time the squirrels are becoming more dependent on the farmer's cornfields and corn cribs. Because recent reforestation is mostly of pines, we may expect the red squirrel to prosper most. Let me stress the fact that these remarks apply only to the chestnut lands such as Charlotteville Township.

GEOGRAPHIC RANGE EXTENSIONS OF THE SMOKY SHREW (Sorex fumeus) IN ONTARIO AND QUEBEC

By LESLIE A. PRINCE

IN JACKSON'S (1928) *Review of the American Long-tailed Shrews*,[1] south central Ontario was given as the geographic range of the Smoky Shrew (*Sorex fumeus*) in the province. With regard to the distribution of this species in Ontario, Jackson states, "The writer has been unable to examine a specimen now in the British Museum recorded from North Bay, Ontario (Miller, 1897, p. 35); the locality has been provisionally included in the map (p. 61) in the range of *S. f. fumeus*." The stated geographic range for the species in Quebec was found to be in the south-eastern portions of the province.

At the time of Jackson's review only three specimens of the smoky shrew, all from Ontario, were extant in the Royal Ontario Museum of Zoology, but since that time extensive collecting in Ontario and Quebec by the Museum has increased this number to 99 specimens from Ontario and 9 from Quebec. This has greatly extended the known range of this species.

Coventry (1932)[2] records the smoky shrew from Temagami. This was one of the earliest range extensions of this species in the province. A specimen was collected by the writer on June 19, 1936, at Peninsula, Thunder Bay District, and on September 8, 1937, John J. Miller collected a specimen at Schreiber, which is approximately sixty miles west of Peninsula. These records constitute the known western limits of the smoky shrew in Ontario.

The known northern limits of this species in Ontario were established when S. C. Downing of the museum staff collected three specimens at Fraserdale, Cochrane District, during the month of June, 1939. During 1938, 1939 and 1940 the writer collected at Favourable Lake, Lake Attawapiskat and Fort Severn on Hudson Bay respectively, all these districts being in the Patricia portion of northern Ontario. No specimens were taken, which indicates that the smoky shrew does not extend that far north in Ontario.

Anderson (1939)[3] has shown that the smoky shrew extends north and east on the north side of the St. Lawrence River to St. Joachim, Montmorency County, Quebec. Specimens collected by the Royal Ontario Museum of Zoology in 1938 extend the range still further north. Five specimens were taken at Lake Edward, seven miles north of Lac la Peche, Champlain County, during May and June and another four specimens seventy miles north at Lake Edward, Quebec County, during June and July.

The present known range of the smoky shrew in Ontario and Quebec north of the St. Lawrence River may therefore be outlined as follows: all of southern and central Ontario north to Fraserdale, Cochrane District, northwest to Schreiber, Thunder Bay District and northeast in Quebec to Lake Edward, Quebec County, and St. Joachim, Montmorency County, Quebec.

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2. COVENTRY, A. F., 1932. Further notes on amphibia and mammalia of the Temagami District of Ontario. *Can. Field-Nat.*, 46: 147.
3. ANDERSON, R. M., 1938. Mammals of the Province of Quebec. *Annual Report Provancher Society of Nat. Hist. of Can.*, pp. 50-114.

A STUDY OF THE FLORA OF WELLINGTON COUNTY, ONTARIO

By JOHN J. STROUD

(continued from page 88)

SOLANACEAE

Solanum Dulcamara L.
S. triflorum Nutt.
S. nigrum L.
**S. rostratum* Dunal.
**S. tuberosum* L.
Physalis heterophylla Nees.
**Nicandra Physalodes* (L.) Pers.
**Lycium halimifolium* Mill.
**Hyoscyamus niger* L.
**Datura Stramonium* L.
**D. Stramonium* L. var. *chalibea* Koch. (*D. Tatula* L.)
**Nicotiana rustica* L.

SCROPHULARIACEAE

**Verbascum Thapsus* L.
**V. Blattaria* L.
**Linaria vulgaris* Hill.
**L. minor* (L.) Desf.
**Antirrhinum majus* L.
Scrophularia marilandica L.
Pentstemon hirsutus (L.) Willd.
**P. laevigatus* Ait.
Chelone glabra L.
Mimulus ringens L.
**Digitalis purpurea* L.
**Veronica maritima* L. (*V. longifolia* L.)
V. americana Schwein.
V. scutellata L.
V. scutellata L., var. *villosa* Schumacher.
V. officinalis L.
**V. Chamaedrys* L.
**V. Teucrium* L.
V. serpyllifolia L.
V. peregrina L.
**V. arvensis* L.
**V. Tournefortii* C. C. Gmel.
Agalinis purpurea (L.) Pennell. (*Gerardia purpurea* L.)
A. paupercula (Gray Britton.) (*Gerardia paupercula* (Gray) Britton)
Pedicularis canadensis L.

LENTIBULARIACEAE

Utricularia vulgaris L., var. *americana* Gray.
U. biflora Lam.
U. intermedia Hayne.

OROBANCHACEAE

Epifagus virginiana (L.) Bart.

MARTYNIACEAE

**Martynia louisiana* Mill.

PHRYMACEAE

Phryma Leptostachya L.

PLANTAGINACEAE

Plantago major L.
P. Rugelii Dcne.
**P. lanceolata* L.
**P. media* L.

RUBIACEAE

Galium Aparine L.
**G. verum* L.
G. circaezans Michx.
G. lanceolatum Torr.
G. boreale L.
**G. Mollugo* L.
G. palustre L.
G. trifidum L.
G. labradoricum Wiegand.
G. triflorum Michx.
Mitchella repens L.

CAPRIFOLIACEAE

Diervilla Lonicera Mill.
Lonicera caerulea L., var. *villosa* (Michx.) T. & G.
**L. tatarica* L.
L. canadensis Marsh.
L. oblongifolia (Goldie) Hook.
L. hirsuta Eat.
L. glaucescens Rydb.
Linnaea borealis L., var. *americana* (Forbes) Rehder.
Triosteum perfoliatum L.
**Viburnum Lantana* L.
V. Opulus L., var. *americanum* (Mill.) Ait.
V. acerifolium L.
V. affine Bush., var. *hypomalacum* Blake. (*V. pubescens* (Ait.) Pursh)
V. cassinoides L.
V. Lentago L.
Sambucus canadensis L.
S. pubens Michx. (*S. racemosa* L.)

VALERIANACEAE

**Valeriana officinalis* L.

DIPSACACEAE

**Dipsacus sylvestris* Huds.
**Succisa pratensis* Moench.
**Knautia arvensis* (L.) T. Coulter.

CUCURBITACEAE

Sicyos angulatus L.
Echinocystis lobata (Michx.) T. & G.

CAMPANULACEAE

**Campanula rapunculoides* L.
C. americana L.
C. rotundifolia L.
C. aparinoides Pursh.
C. uliginosa Rydb.

LOBELIACEAE

Lobelia cardinalis L.
L. siphilitica L.
L. spicata Lam.
L. Kalmii L.
L. inflata L.

COMPOSITAE

Eupatorium purpureum L.
E. perfoliatum L.
E. urticaefolium Reichard.
**Grindelia perennis* A. Nels. (*G. squarrosa* (Pursh) Dunal.)
Solidago squarrosa Muhl.
S. caesia L.
S. caesia L., var. *axillaris* (Pursh) Gray.
S. latifolia L.
S. bicolor L.
S. hispida Muhl.
S. humilis Pursh. (*S. uliginosa* Nutt.)
S. patula Muhl.
S. arguta Ait.
S. juncea Ait.
S. juncea Ait., var. *scabrella* (T. & G.) Gray.
S. uniligulata (DC.) Porter, var. *neglecta* (T. & G.) Fernald. (*S. neglecta* T. & G.)
S. rugosa Mill.
S. canadensis L.
S. altissima L.
S. serotina Ait.
S. graminifolia (L.) Salisb.
**Bellis perennis* L.
Aster macrophyllus L.
A. novae-angliae L.
A. cordifolius L.
A. Lowrieanus Porter.
A. sagittifolius Wedemeyer.
A. sagittifolius Wedemeyer, var. *uropryllus* (Lindl.) Burgess.
A. Lindleyanus T. & G.
A. laevis L.
A. multiflorus Ait.
A. lateriflorus (L.) Britton.
A. Tradescanti L.
A. paniculatus Lam.
A. paniculatus Lam., var. *lanatus* Fernald.
A. junceus Ait.
A. longifolius Lam.
A. puniceus L.
A. umbellatus Mill.
Erigeron pulchellus Michx.
E. philadelphicus L.
E. annuus (L.) Pers.
E. ramosus (Walt.) BSP.
E. canadensis L.
Antennaria plantaginifolia (L.) Richards.
A. fallax Greene.
A. neodioica Greene.
A. neglecta Greene.
Anaphalis margaritacea (L.) B. & H.
Gnaphalium obtusifolium L. (*G. polycephalum* Michx.)
G. decurrens Ives.
G. uliginosum L.
**Inula Helenium* L.
Polymnia canadensis L.
Iva xanthifolia Nutt.
Ambrosia trifida L.
A. trifida L., var. *integrifolia* (Muhl.) T. & G.
A. artemisiifolia L.
A. psilostachya DC.
Xanthium canadense Mill.
X. italicum Mor. (*X. commune* Britton.)
Heliopsis scabra Dunal.
Rudbeckia hirta L.
R. laciniata L.
Lepachys columnaris (Sims) T. & G.
Helianthus annuus L.
H. scaberrimus Ell.
H. giganteus L.
H. divaricatus L.
H. tuberosus L.
Bidens frondosa L.
B. connata Muhl.
B. cernua L.
**Galinsoga ciliata* (Raf.) Blake. (*G. parviflora* Cav., var. *hispida* DC.)
Helenium autumnale L.
Gaillardia aristata Pursh.
**Achillea Ptarmica* L.
A. Millefolium L.
**Anthemis Cotula* L.
**A. tinctoria* L.
**Matricaria suaveolens* (Pursh) Buchenau.
**Chrysanthemum Leucanthemum* L.
**C. Leucanthemum* L., var. *pinnatifidum* Lecoq & Lamotte.
**C. segetum* L.
**C. Parthenium* (L.) Bernh.
**C. Balsamita* L., var. *tanacetoides* Boiss.
**Tanacetum vulgare* L.
**Artemisia ludoviciana* Nutt.

*A. *vulgaris* L.
*A. *biennis* Willd.
*A. *frigida* Willd.
*A. *pontica* L.
*A. *gnaphalodes* Nutt.
Petasites palmatus (Ait.) Gray.
Erechtites hieracifolia (L.) Raf.
**Senecio vulgaris* L.
**S. Jacobaea* L.
S. aureus L.
S. Balsamitae Muhl.
**Arctium minus* (Hill.) Bernh.
**Carduus nutans* L.
**C. crispus* L.
**Cirsium lanceolatum* (L.) Hill.
C. undulatum (Nutt.) Spreng.
C. discolor (Muhl.) Spreng.
C. muticum Michx.
**C. arvense* (L.) Scop.
**C. arvense* (L.) Scop., var. *integrifolium* Wimm. & Grab.
**Onopordum Acanthium* L.
**Silybum marianum* (L.) Gaertn.
**Centaurea solstitialis* L.
**C. Jacea* L.
**C. Jacea* L., var. *lacera* Koch.
**C. Jacea* L., var. *nigra* (L.) Briquet. (*C. nigra* L.)
**C. Cyanus* L.
**C. Scabiosa* L.
**C. vochinensis* Bernh.
**C. montana* L.
**Lapsana communis* L.
**Cichorium Intybus* L.
**Hypochaeris glabra* L.
**Apargia autumnale* (L.) Hoffm. (*Leontodon autumnalis* L.)
**Picris hieracioides* L.
**P. echioides* L.
**Tragopogon porrifolius* L.
**T. pratensis* L.
**Taraxacum officinale* Weber.
**T. laevigatum* (Willd.) DC. (*T. erythrospermum* Andrz.)
**Sonchus arvensis* L.
**S. oleraceus* L.
**S. asper* (L.) Hill.
**Lactuca scariola* L.
**L. scariola* L., var. *integrata* Gren. & Godr.
L. canadensis L.
L. hirsuta Muhl.
L. pulchella (Pursh.) DC.
L. spicata (Lam.) Hitchc.
L. spicata (Lam.) Hitchc., var. *integrifolia* (Gray) Britton.
**Crepis capillaris* (L.) Wallr.
Prenanthes alba L.
P. altissima L.
**Hieracium floribundum* Wimm. & Grab.
**H. aurantiacum* L.
**H. praealtum* Goch., var. *decipiens* Koch.
**H. vulgatum* Fries.
H. canadense Michx.

TABULAR CONSPECTUS OF THE FLORA OF WELLINGTON COUNTY, ONTARIO.

(including at least 314 introduced species)

Families	Genera	Species*	Families	Genera	Species*
1. Polypodiaceae	15	28	22. Orchidaceae	12	27
2. Osmundaceae	1	4	23. Salicaceae	2	14
3. Ophioglossaceae	1	1	24. Myricaceae	1	1
4. Equisetaceae	1	5	25. Juglandaceae	2	4
5. Lycopodiacea	1	4	26. Betulaceae	5	10
6. Taxaceae	1	1	27. Fagaceae	3	4
7. Pinaceae	7	11	28. Urticaceae	9	12
8. Typhaceae	1	2	29. Santalaceae	1	2
9. Sparganiaceae	1	2	30. Loranthaceae	1	1
10. Najadaceae	1	7	31. Aristolochiaceae	2	3
11. Juncaginaceae	2	3	32. Polygonaceae	3	20
12. Alismaceae	2	6	33. Chenopodiaceae	7	15
13. Hydrocharitaceae	2	2	34. Amaranthaceae	1	5
14. Gramineae	45	100	35. Arizoaceae	1	1
15. Cyperaceae	7	113	36. Caryophyllaceae	9	18
16. Araceae	4	4	37. Portulacaceae	2	3
17. Lemnaceae	1	1	38. Nymphaeaceae	2	2
18. Pontederiaceae	1	1	39. Ranunculaceae	10	32
19. Juncaceae	2	9	40. Menispermaceae	1	1
20. Liliaceae	18	29	41. Berberidaceae	4	5
21. Iridaceae	3	3	42. Papaveraceae	4	4

Families	Genera	Species*
43. Fumariaceae	4	5
44. Cruciferae	25	48
45. Capparidaceae	1	2
46. Sarraceniaceae	1	1
47. Droseraceae	1	1
49. Saxifragaceae	7	15
50. Hamamelidaceae	1	1
51. Rosaceae	18	46
52. Leguminosae	16	30
53. Linaceae	1	1
54. Oxalidaceae	1	4
55. Geraniaceae	1	4
56. Rutaceae	1	1
57. Polygalaceae	1	2
58. Euphorbiaceae	2	10
59. Limnanthaceae	1	1
60. Anacardiaceae	1	3
61. Aquifoliaceae	2	2
62. Celastraceae	2	3
63. Staphyleaceae	1	1
64. Aceraceae	1	7
65. Sapindaceae	1	2
66. Balsaminaceae	1	2
67. Rhamnaceae	2	4
68. Vitaceae	2	2
69. Tiliaceae	1	1
70. Malvaceae	4	6
71. Hypericaceae	1	6
72. Violaceae	1	15
73. Thymelaeaceae	2	2
74. Elaeagnaceae	1	1
75. Lythraceae	2	2
76. Onagraceae	3	11
77. Haloragidaceae	1	1
78. Araliaceae	2	4
79. Umbelliferae	17	19
80. Cornaceae	1	6
81. Ericaceae	11	21
82. Primulaceae	5	8
83. Oleaceae	3	7
84. Gentianaceae	3	4
85. Apocynaceae	2	3
86. Asclepiadaceae	2	4
87. Convolvulaceae	2	4
88. Polemoniaceae	2	4
89. Hydrophyllaceae	1	1
90. Boraginaceae	7	13
91. Verbenaceae	1	2
92. Labiatae	21	33
93. Solanaceae	7	12
94. Scrophulariaceae	11	25
95. Lentibulariaceae	1	3
96. Orobanchaceae	1	1
97. Martyniaceae	1	1
98. Phrymaceae	1	1
99. Plantaginaceae	1	4
100. Rubiaceae	2	12
101. Caprifoliaceae	6	17
102. Valerianaceae	1	1
103. Dipsacaceae	3	3
104. Cucurbitaceae	2	2
105. Campanulaceae	1	5
106. Lobeliaceae	1	5
107. Compositae	49	146
TOTALS	481	1,147

* Including Varieties and Forms.

HENRY CARL NUNN

1883 - 1940

The death of H. C. Nunn occurred at Hamilton on July 9th, 1940. Although Mr. Nunn contributed little to the literature of natural history, his efforts on behalf of various causes have meant much to nature education and nature appreciation, not only in Ontario but throughout Canada.

Mr. Nunn was a business man to whom nature meant so much that he desired to share his joy in it with others. Born at Bolton, Ontario, Mr. Nunn entered business after attending the local Continuation School and taking a business course at Hamilton. After experience in various business organizations in Hamilton, Cleveland and Winnipeg, he acquired a small mail order business in Hamilton in 1913 which he developed under the name of the Halliday Company, until at the time of his death, it was of large proportions and covered much of Canada.

The appeal of nature, always strong even in boyhood, broadened and deepened until in his later years it became a dominating interest in his life. He was a combination of aesthetic nature lover and shrewd business man. This rare endowment backed by his energy and insight enabled him to accomplish much in furthering a love of nature among young people. Although it would be incorrect to say that he carried on his business to further his hobby, he did use his business to promote nature education, especially among boys and girls. The organization of Junior Bird Clubs across Canada, under the National Audubon Society, was largely the work of H. C. Nunn, although carried on under the name of the Hamilton Bird Protection Society. Circulars outlining the organization of Junior Bird Clubs were included in Halliday Company

advertising material mailed throughout Canada. By this means, most of the 1,289 clubs in Canada with a membership of 24,654 in 1940 were formed. Contests conducted by his company offered such prizes as several weeks' holiday for boys and girls at different camps. The company also sponsored radio broadcasts by well-known naturalists.

Mr. Nunn was one of the founders and for sometime President of the Hamilton Bird Protection Society. When the Federation of Ontario Naturalists was formed in 1931, he became one of its earliest and most enthusiastic supporters. He served as Chairman of the Executive of the Federation from 1933 until compelled through failing health to relinquish the position in the spring of 1940. Many of the most worthwhile Federation projects owed their initiation to Mr. Nunn's vision and enthusiasm. These include the Regional Gatherings, Nature Broadcasts and the Summer Nature School.

Mr. Nunn was not a collector. His home had no accumulation of outdoor trophies but, in a deeper sense, he had abundance of that unseen treasure of mind and heart and memory gathered thoughout life. No one could be long in his presence without feeling the wholesome influence of a man who had lived in close contact with nature. Those who had the privilege of knowing him will long feel the influence of his love of nature and of his efforts to share this interest with others. In his death nature and naturalists in Ontario have suffered an irreparable loss.

J. R. DYMOND,

S. L. THOMPSON.

BOOK REVIEWS

MOSS FLORA OF NORTH AMERICA NORTH OF MEXICO, *by A. J. Grout and others. Published and edited by A. J. Grout, Newfane, Vermont.*

With the appearance, in September, 1940, of Vol. II, part 4, Dr. Grout's monumental work, of which the first part was published in September, 1928, has been completed.

The Flora consists of three volumes, each of four parts, and provides adequate keys to the families, genera and species, also synonyms, descriptions and full references to exsiccates and to illustrations in standard works on mosses. There are a total of 319 plates, and all species not previously illustrated in the author's *Mosses with Hand-lens and Microscope* are illustrated by excellent line drawings (and a few photographs). A number of the plates are original and have been drawn by Seville Flowers, while the balance are borrowed from standard works of mosses.

A complete index to the families, genera and species treated is given at the end of each volume. A complete generic index to all three volumes is furnished with Vol. II, part 4. A list of the exsiccatae cited would have been welcomed by all curators of herbaria.

Besides editing the entire work Dr. Grout has contributed a number of keys and parts of the text. His collaborators are: LeRoy Andrews, Stanley A. Cain, Mrs. E. J. Craig, Seville Flowers, T. C. Frye, Mrs. Inex M. Haring, G. N. Jones, Miss Geneva Sayre, A. J. Sharp, Wm. C. Steere, W. T. Wareham and Winona H. Welch.

To the serious student of North American mosses this work is indispensible and fills the urgent need for an up-to-date mannual; to those who collect mosses as a hobby it will prove a valuable book of reference and will supplement Dr. Grout's previous, more popular, handbooks: *Mosses with a Hand-lens* and *Mosses with Hand-lens and Microscope*.

In the preparation of the Flora Dr. Grout and his collaborators have studied practically all critical material in the Moss Herbarium of the National Museum of Canada, including the "types" of the numerous species described by Kindberg, many of which have since caused considerable trouble to bryologists. All such critical specimens and also all numbers of Prof. Macoun's exsiccate "Canadian Musci" are cited.

The reviewer wishes to call attention to Vol. 43, No. 5 of *The Bryologist,* which contains complete, up-to-date check lists of North America *Bryophytae*. The three separate lists are as follows:

"List of Mosses of North America North of Mexico" by A. J. Grout.

"List of North American Species of *Sphagnum*" by A. LeRoy Andrews.

"List of *Hepaticae* found in the United States, Canada and Arctic America" by Alexander W. Evans.

Copies of this special check list number of *The Bryologist* may be obtained at the modest price of ten cents from the Sullivant Moss Society, by addressing Dr. Lewis E. Anderson, Department of Botany, Duke University, Durham, N.C., U.S.A. —A.E.P.

ON THE HUDSON BAY EIDER. *By L. L. Snyder. Occasional Papers of the Royal Ontario Museum of Zoology, Number* 6. *University of Toronto Press, Toronto, Ontario, May* 5, 1941.

Somateria mollissima sedentaria, subsp. nov., is described and compared with other races of this species. The newly-described subspecies remains throughout the year on Hudson Bay, including James Bay, south of Cape Fullerton and Mansel Island, yet its wings are distinctly longer than those of other, more highly migratory, races of *S. mollissima.*—H.F.L.

THE BIRDS OF THE VICINITY OF LAKE NIPISSING, ONTARIO. *By William E. Ricker and C. H. D. Clarke. Contributions of the Royal Ontario Museum of Zoology. No.* 16, 1939. (Place of publication not stated, but is probably Toronto, Ontario, Canada.)

This is an annotated list of the birds known to the authors, up to the time of completion of their manuscript, to have occurred on Lake Nipissing or within ten miles of that lake. The information on which it is based is provided by their personal records and those of other observers, by specimens preserved in various collections, and by the literature containing records of birds in the area under consideration. The result is a carefully-prepared, reliable list of 209 species.

Such regional lists as this, prepared by competent workers, are very useful in summarizing existing knowledge of the avifauna of a given area. They make clear the extent of available information and make reference to it convenient for every one interested, they reveal the gaps that need to be filled by further investigation, and they provide essential material from which descriptions of the avifauna of larger tracts and of the distribution of species may be pieced together. Many more such lists are needed.

The Lake Nipissing region lies in the Great Lakes-St. Lawrence Region of the Forest Formation of Canada. Its avifauna is of particular interest, both because many birds reach the limit of their range in this vicinity and because comparatively rapid changes in the composition of the avian population appear to be taking place.

The present list records the known limits of seasonal occurrence of the species of which it treats, but is admittedly somewhat weak with reference to such data in autumn. The observations stated hereunder, taken from the reviewer's personal records, extend somewhat the known period of occurrence in the Lake Nipissing region of the birds named. In each case the number in parentheses immediately following the date of observation is the number of individuals observed. Except where otherwise stated, these observations were made at or near Callander, Ontario.

Ardea herodias. GREAT BLUE HERON. October 11, 1939 (1).

Buteo borealis. RED-TAILED HAWK. October 11, 1939 (1).

Capella delicata. WILSON'S SNIPE. October 26, 1937 (1).

Sterna hirundo. COMMON TERN. September 16, 1938 (12).

Megaceryle alcyon. BELTED KINGFISHER. September 16, 1938 (1).

Sayornis phoebe. EASTERN PHOEBE. September 16, 1938 (1).

Hirundo erythrogaster. BARN SWALLOW. April 27, 1938 (1).

Penthestes hudsonicus. BROWN-HEADED CHICKADEE. November 5, 1936 (1).

Certhia familiaris. BROWN CREEPER. October 11, 1939 (1).

Dumetella carolinensis. CATBIRD. September 16, 1938 (2).

Dendroica coronata. MYRTLE WARBLER. April 29, 1937 (1).

Geothlypis trichas. MARYLAND YELLOW-THROAT. September 16, 1938 (1).

Hesperiphona vespertina. EVENING GROSBEAK. October 30, 1935 (15 at North Bay, 2 at Callander) and November 5, 1936 (6 at Callander).

Carpodacus purpureus. COMMON PURPLE FINCH. April 30, 1937 (1); April 27, 1938 (2); October 11, 1939 (2)., and April 26, 1941 (1).

Spizella passerina. CHIPPING SPARROW. September 16, 1938 (9) and September 13, 1940 (17).

Zonotrichia leucophrys. WHITE-CROWNED SPARROW. October 11, 1939 (2).

Zonotrichia albicollis. WHITE-THROATED SPARROW. October 11, 1939 (2).—HARRISON F. LEWIS.

NOTES AND OBSERVATIONS

SNOW BUNTING AT CRESCENT, B.C.—A Snow Bunting (*Plectrophenax nivalis*) was observed at the end of Blackie's Spit, Crescent Beach, on November 6th, 1940. It was extremely tame and allowed me to approach within a few feet. The spit is a narrow neck of mud and gravel running in a north-easterly direction between Boundary Bay and a backwater at the mouth of the Nicomekl River six miles north of the International Boundary. This observation is interesting as I came across a flock of seven snow buntings at identically the same spot on November 5th, 1936. On both occasions the birds were seen just before a spell of cold stormy weather. As far as I know these are the only records of snow buntings for the Surrey Municipality.

In *Birds of the Vancouver District, British Columbia,* published in January, 1932, Mr. R. A. Cumming calls the Eastern Snow Bunting a scarce irregular winter migrant and mentions collecting a specimen on Lulu Island in November, 1924. Lulu Island is about ten miles north-west of Crescent at the mouth of the Fraser.

These records of mine may help to prove that there is an irregular migration* of snow buntings along the southern coast of British Columbia apparently during November.—M. W. HOLDOM.

* Allan Brooks (*The Auk* Vol. 24, 1917) reports the Snow Bunting as a "scarce though fairly regular winter visitor to Sumas Prairie".—P. A. TAVERNER.

NESTING OF THE PIGEON HAWK (*Falco columbarius*) IN THE CITY OF FORT WILLIAM.—Lewis and Smith have noted that Pigeon Hawks apparently nested in the City of Ottawa in 1936 (*Can. Field-Nat.;* vol. 53, Mar., 1939, p. 45). We here record the nesting of a pair of these hawks in the City of Fort William in 1941. On April 23, a Pigeon Hawk was seen at the edge of Vickers Park. During the last week of April and the month of May one or two birds were seen each time the park was visited and they were occasionally observed flying in the adjacent parts of the city. When disturbed in the park they became greatly agitated and uttered their peculiar cry.

This park, near the outskirts of the residential part of the city, is about 10 acres in extent. It is bordered on two sides by open fields ,on the third by a well-travelled street and on the fourth by a busy highway. Shrubs, deciduous trees, and black spruce (*Picea mariana*) occur in moderate numbers throughout the park. The latter species is fairly abundant about several adjacent residences.

These trees were unsuccessfully examined for the nest on several occasions, including May 8, when a crow's nest was found at an elevation of 25 feet. This nest contained one fresh egg. On May 29 the park was again visited and the male appeared perched on the top of a tree, and protested my presence vigorously. At this juncture the female was flushed from a nest located in a black spruce tree at some distance from the border of the park. The nest, evidently an old crow's, but relined, was placed near the trunk of the tree some 20 feet from the ground. It contained 4 fresh eggs. The hawks make no attempt to attack us while the nest and eggs were being examined but both birds remained near by screaming vigorously.

The Pigeon Hawk is not an uncommon bird in this area. In 1938 a nest containing 3 eggs was found about 8 miles west of Fort William on June 10 and nests containing 5, 4 and 3 eggs were found on May 30, June 13, and June 24 in the Whitefish Lake region some 50 miles south west of the City by Lt. Col. L. S. Dear and the author of this note. All were found in black spruce trees. Insofar as we are aware, this is the first time they have actually nested within the city limits.—A. E. ALLIN.

Wolffia punctata Griseb. IN QUEBEC.—On October 3rd, 1939 I visited a small pond in some waste ground at Crawford Park, near Montreal. The pond is within the city limits of Verdun, Hochelaga County. On the surface of the water was a continuous green film consisting of enormous numbers of small duckweed plants belonging to the genus Wolffia. On examination these prove to be *W. punctata* Griseb. (*W. braziliensis* auct.).

Mr. A. E. Porsild informs me that this species is represented in the National Herbarium by specimens from southern Ontario and from Ottawa. Neither this nor *W. columbiana* are recorded from Quebec. according to Victorin (*Flore Laurentienne* p. 846). Duplicate specimens have been forwarded to the National Herbarium and to the Institut Botanique, University of Montreal.—V. C. WYNNE-EDWARDS.

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NOTES ON BIRDS OF THE JAMES BAY REGION IN THE AUTUMN OF 1940

By HARRISON F. LEWIS[1] and HAROLD S. PETERS[2]

DURING the period from September 15 until October 7, 1940, we visited the James Bay region for the purpose of securing information on migratory birds for our respective departments. Through the courtesy of the Indian Affairs Branch of the Canadian Department of Mines and Resources we were able to use the motorboat *Charles Stewart* for our travels about this great "bay", which is 245 miles long and 140 miles wide.

We arrived at the end of steel at Moosonee, Ontario, on the evening of September 14 and spent the night at Moose Factory, on an island in the Moose River. Our boat trip, which started the following afternoon, was divided into two cruises. The first cruise took us along the west side of James Bay, to Attawapiskat, Ontario; Akimiski Island, Northwest Territories; and Albany, Ontario, in the order named. We returned to Moose Factory on September 23rd to refuel and, after being delayed by bad weather, left the mouth of the Moose River on September 26th for our second cruise. This time we steered for the east side of James Bay, where we visited successively Charlton Island and Strutton Islands, Northwest Territories; Eastmain, Quebec; Caroline Shoals, Northwest Territories; and Rupert House, Quebec. At Rupert House, where we arrived on October 1st and departed on October 2nd, we transferred from the *Charles Stewart* to a smaller motorboat, the *Jacqueline*, belonging to Mr. J. S. C. Watt, of that place, who accompanied us for the rest of our voyage. We subsequently visited Cabbage Willows Bay and Boatswain Bay, Quebec; and Plover Shoals and the Mississikabe River, Ontario. On October 5th we again arrived at Moose Factory and on October 7th we travelled southward on the weekly train from Moosonee.

1. National Parks Bureau, Dept. of Mines and Resources, Ottawa.
2. Fish and Wildlife Service, U.S. Dept. of the Interior, Charleston, S.C.

During the twenty-three days mentioned we travelled approximately 850 miles by motorboat and canoe on the western, southern and eastern parts of James Bay, and recorded a total of 81 species of birds. We wish to express our gratitude and appreciation to the many who most kindly assisted us, especially to Dr. H. W. McGill, Director of Indian Affairs, and to the late Dr. W. L. Tyrer and other officials of that Branch, and to Mr. J. S. C. Watt and other officials of the Hudson's Bay Company.

Since there are few published records of birds for this region we are presenting in detail below some of our more interesting and important records. We are also listing the other bird species observed in the region, the birds recorded on Akimiski Island, those found on the Strutton Islands, and those observed at Plover Shoals, Hannah Bay.

1. *Colymbus auritus.* HORNED GREBE.—Our only record is that of one bird seen in the mouth of Albany River in the late afternoon of September 22.

2. *Phalacrocorax auritus.* DOUBLE-CRESTED CORMORANT.—None observed along the west side of James Bay or around the Moose River. Seen first near Charlton Island on September 26 (three), and thereafter at the Strutton Islands on September 27 (six) and near Eastmain on September 28 (one); at Caroline Shoals on September 29 they were common, and on September 30 when we approached Way Rock we saw 70 of them. We landed on that rock on the afternoon of September 30 and found 65 old nests of this species still visible despite the action of waves and rains since the nesting season. This is the only nesting colony of Cormorants known from Hudson Bay or James Bay. It was observed by W. E. C. Todd in 1912. No Cormorants were seen as we continued southward in the first week of October.

3. *Botaurus lentiginosus.* AMERICAN BITTERN.—One was flushed at close range by Lewis at Cabbage Willows Bay, on the west side of Rupert Bay, on October 2. We were told by a local resident that the species nests near Eastmain.

4. *Branta canadensis.* CANADA GOOSE.—First recorded at the mouth of the Attawapiskat River on September 17. Recorded in small numbers at Akimiski Island on September 18 and 19, at the mouth of the Albany River on September 22, at Ship Sands Island, in the mouth of the Moose River, on September 25, and at Charlton Island on September 26. About 260 seen at the Strutton Islands during a storm on September 27, a few observed at Caroline Shoals on September 29, a small flock at the mouth of Rupert Bay on September 30, about 50 near Rupert House on October 1, about the same number in Boatswain Bay on October 3, and about 100 at the Hannah Bay Sanctuary on October 4. We were told by local residents that larger groups occur at times during migration, particularly in spring, and that the species nests locally around James Bay.

5. *Branta bernicla.* COMMON BRANT.—About 175 brant were observed at Charlton Island on September 26, and 7 were found at the Strutton Islands on September 27. We were told by a former resident of Akimiski Island that thousands of Brant formerly gathered in the shallow water at the southeast end of the island to feed and rest during migration. Reports from several places on the shores of James Bay indicate that this species no longer occurs in that region in numbers.

6. *Chen hyperborea.* SNOW GOOSE.—A common to abundant migrant in James Bay, feeding and resting in greatest numbers in the marshes along the western side of the bay. We were too early to see them at their best, but found small numbers mingled with larger numbers of Blue Geese in the marshes at the mouths of the Attawapiskat, Albany, and Moose Rivers. Some were seen on Akimiski Island, a few at Rupert Bay, and a few at Hannah Bay Sanctuary. The majority of the migrating flocks arrived later in October and were reported as being more numerous than in the previous year. In the flocks that we saw we noted indications of a good production of young birds.

7. *Chen caerulescens.* BLUE GOOSE.—A very common to abundant migrant in the James Bay region, gathering in great flocks to feed in the extensive coastal marshes. We found Blue Geese in small numbers in the marashes at the mouths of the Attawapiskat, Albany, and Moose Rivers, on the south side of Akimiski Island, on Charlton Island and Strutton Islands, at Eastmain and Boatswain Bay; but they were numerous in Rupert Bay, especially at Cabbage Willows Bay, where we estimated that we saw 12,000 on October 2. About 3,000 were found at Hannah Bay Waterfowl Sanctuary on October 4. We were a little too early in the season to see the largest flocks of these birds and learned subsequently that large numbers migrated through this area later in October.

Local residents informed us that twenty years ago Blue Geese were not at all common in the southward migration along the west coast of James Bay and Snow Geese occurred there in that migration in abundance, but that the proportion of Blue Geese seen on that side of the bay in autumn has gradually increased until they are about equal in numbers to the Snow Geese. On the east side of the bay the Blue Geese, as far as we are informed, have always greatly outnumbered the Snow Geese and still do so.

At Cabbage Willows Bay on October 2 we were greatly interested to observe the methods used by the Indians to preserve Blue Geese for winter food. The birds are dry plucked and dismembered, and the pieces are hung in rows on racks in the teepees, to be dried and smoked by the fire burning brightly in the center of each temporary home. Nothing is wasted; even the feet are preserved after having been slit along the under side of each toe to facilitate the drying. The dried meat is packed in bags and constitutes an essential part of the Indians' food until the trapping season enables them to obtain fresh carcasses of muskrat, beaver, and other mammals.

8. *Anas platyrhynchos.* MALLARD DUCK.—We observed this species only twice; first at Cabbage Willows Bay on October 2, and again at Hannah Bay on October 4. Five others were examined in hunters' bags in early October. Generally only a few Mallards migrate through James Bay.

9. *Anas rubripes.* BLACK DUCK.—The second most abundant duck at James Bay, found in the marshes along the western and southern sides of the bay, around river mouths, and in suitable marshy habitats on the islands that we visited.

10. *Mareca americana.* BALDPATE.—Two records: 7 found in a pond on Akimiski Island on September 19 and 7 at Hannah Bay on October 4.

11. *Dafila acuta.* PINTAIL.—Much the most numerous duck in the James Bay region during our visit. It was found at each locality visited, feeding in marshes along the mainland coast and on the islands. As many as 5,000 were seen at Ship Sands Island at the mouth of the Moose River on September 25 and 4,000 at Hannah Bay on October 4.

12. *Nettion carolinense.* GREEN-WINGED TEAL.—Common around James Bay during our visit and found at nearly every locality visited. The only ducks that exceeded it in numbers were the Pintail and the Black Duck.

13. *Nyroca affinis.* LESSER SCAUP DUCK.—Observed only at the mouth of the Moose River, the mouth of the Albany River, the Strutton Islands, and Caroline Shoals.

14. *Glaucionetta clangula.* COMMON GOLDENEYE.—Generally distributed in small numbers. Observed at Attawapiskat River, Akimiski Island, Albany River, Charlton Island, Strutton Islands, Caroline Shoals, Boatswain Bay, Rupert Bay, and Hannah Bay.

15. *Clangula hiemalis.* OLD-SQUAW.—The only one seen was observed near Caroline Shoals on September 29.

16. *Somateria mollissima.* COMMON EIDER DUCK.—Nine females and 9 young not yet able to fly were observed at the Strutton Islands on September 27.

17. *Melanitta deglandi.* WHITE-WINGED SCOTER.—The second most common scoter, recorded offshore during our boat trips from point to point. The largest number observed in one day was 100, found between Charlton Island and the Strutton Islands on September 27.

18. *Melanitta perspicillata.* SURF SCOTER.—Recorded only a few times and in small numbers offshore.

19. *Oidemia americana.* AMERICAN SCOTER.—The most common scoter, seen in open waters on both sides of James Bay, sometimes in scattered companies containing 100 to 400 individuals.

20. *Mergus serrator.* RED-BREASTED MERGANSER.—Generally distributed in small to moderate numbers.

21. *Lagopus lagopus.* WILLOW PTARMIGAN.—On September 19 two flocks, totalling 24 birds, were found on an old burn on dry, sandy ridges, 2 or 3 miles inland on Akimiski Island.

22. *Pluvialis dominica.* AMERICAN GOLDEN PLOVER.—Three observed at Attawapiskat on September 17, five observed at Cabbage Willows Bay on October 2, and five at Hannah Bay Sanctuary on October 4.

23. *Squatarola squatarola.* BLACK-BELLIED PLOVER.—Generally distributed in small numbers.

24. *Capella delicata.* WILSON'S SNIPE.—Widely distributed; found at Attawapiskat, Akimiski Island, Ship Sands Island, Charlton Island, Strutton Islands, Caroline Shoals, and Hannah Bay Sanctuary. Common in September, rare in October. Forty-seven in one flock seen at Attawapiskat on September 17.

25. *Totanus melanoleucus.* GREATER YELLOWLEGS.—Common and generally distributed. On October 3rd, when we were miles from the nearest land and the water was very smooth, two birds of this species overtook the motorboat on which we were travelling and flew past it. A short distance ahead, one of them alighted on the water and closed its wings, while the other one circled about. When, after about half a minute, the boat approached them, the bird on the water rose and both birds flew away.

26. *Pisobia bairdi.* BAIRD'S SANDPIPER.—Found with other sandpipers on Akimiski Island on September 18 and at Cabbage Willows Bay on October 2.

27. *Larus philadelphia.* BONAPARTE'S GULL.—Several seen at the mouth of the Moose River, at Attawapiskat River, Akimiski Island, and Charlton Island.

28. *Xema sabini.* SABINE'S GULL.—At noon on September 26, a calm, sunny day, when the *Charles Stewart* was about 10 miles south of Charlton Island, a bird of this species soared slowly over the boat at a height of about 30 feet. Lewis, who was the only person on deck at the time, had an excellent view of it, and noted distinctly the solid black wing-tips, the large white area in the rear part of each wing, the head with white top and darker auriculars and nape, and the forked tail with a narrow black line parallel to each side of the fork. Within a few minutes the identification was checked with the illustration in Peterson's *Field Guide to the Birds.*

29. *Hydroprogne caspia.* CASPIAN TERN.—Two observed flying over the settlement at Albany, at a height of about 100 feet, in the afternoon of September 22. Their distinctive cries, with which we are very familiar, drew our attention to them in spite of a strong wind, and they were very clearly seen under excellent light conditions.

30. *Surnia ulula.* HAWK OWL.—Recorded on Akimiski Island on September 18 and 19, and at Albany on September 22.

31. *Asio flammeus.* SHORT-EARED OWL.—The most abundant owl, found at Attawapiskat, Aki-

miski Island, Moose River, Strutton Islands, and Rupert Bay, and also at sea between Attawapiskat and Albany on September 21 and near Hannah Bay on October 5.

(*Archilochus colubris.* RUBY-THROATED HUMMINGBIRD.—One was reported by Mr. and Mrs. A. H. Michell to have visited the settlement at Attawapiskat for 2 days in the latter part of July, 1940.)

32. *Dryobates pubescens.* DOWNY WOODPECKER.—Two together were seen by Lewis on Akimiski Island on September 18.

33. *Corvus corax.* RAVEN.—Four records: Akimiski Island, September 18 (Lewis); Strutton Islands, September 27; Caroline Shoals, September 29; and Hannah Bay, October 4.

34. *Corvus brachyrhynchos.* CROW.—Found at three localities: lower Moose River, Attawapiskat, and Albany.

35. *Hylocichla guttata.* HERMIT THRUSH.—Last recorded at Rupert House on October 2.

36. *Anthus spinoletta.* AMERICAN PIPIT.—Recorded at Attawapiskat, Akimiski Island, Charlton Island, Strutton Islands, and Cabbage Willows Bay.

37. *Sturnus vulgaris.* COMMON STARLING.—Twelve seen at Albany on September 22.

38. *Dendroica coronata.* MYRTLE WARBLER.—Our latest record was September 22 at Albany.

39. *Dendroica palmarum.* PALM WARBLER.—Latest record at Moosonee on September 24.

40. *Oporornis philadelphia.* MOURNING WARBLER.—Our only record is that of one bird seen at Albany, September 22.

41. *Geothlypis trichas.* MARYLAND YELLOWTHROAT.—Latest record at Albany on September 22.

42. *Euphagus carolinus.* RUSTY BLACKBIRD.—Three records: Moose Factory on September 15, Akimiski Island on September 19, and Rupert House on October 2.

43. *Loxia leucoptera.* WHITE-WINGED CROSSBILL.—Observed in flocks at Eastmain on September 28. A Crossbill not identified specifically was observed at Rupert House on October 2.

44. *Zonotrichia leucophrys.* WHITE-CROWNED SPARROW.—To our surprise we observed but one individual of this species. It was seen at Eastmain on September 28.

45. *Melospiza lincolni.* LINCOLN'S SPARROW.—Observed at Moosonee, Attawapiskat, and Albany.

46. *Plectrophenax nivalis.* SNOW BUNTING.—First observed at Caroline Shoals on September 29.

Other species recorded during our trip in the James Bay area are:

47. *Gavia immer.* COMMON LOON.
48. *Gavia stellata.* RED-THROATED LOON.
49. *Buteo lagopus.* COMMON ROUGH-LEGGED HAWK.
50. *Circus hudsonius.* MARSH HAWK.
51. *Pandion haliaeetus.* OSPREY.
52. *Falco peregrinus.* PEREGRINE FALCON.
53. *Falco columbarius.* PIGEON HAWK.
54. *Canachites canadensis.* SPRUCE GROUSE.
55. *Charadrius semipalmatus.* SEMIPALMATED PLOVER.
56. *Arenaria interpres.* COMMON TURNSTONE.
57. *Pisobia melanotos.* PECTORAL SANDPIPER.
58. *Pisobia fuscicollis.* WHITE-RUMPED SANDPIPER.
59. *Pelidna alpina.* DUNLIN.
60. *Ereunetes pusillus.* SEMIPALMATED SANDPIPER.
61. *Crocethia alba.* SANDERLING.
62. *Larus argentatus.* HERRING GULL.
63. *Sterna* (sp. ?). TERN, COMMON OR ARCTIC.
64. *Colaptes auratus.* YELLOW-SHAFTED FLICKER.
65. *Picoides arcticus.* ARCTIC THREE-TOED WOODPECKER.
66. *Otocoris alpestris.* HORNED LARK.
67. *Perisoreus canadensis.* CANADA JAY.
68. *Penthestes atricapillus.* BLACK-CAPPED CHICKADEE.
69. *Penthestes hudsonicus.* BROWN-HEADED CHICKADEE.
70. *Turdus migratorius.* AMERICAN ROBIN.
71. *Corthylio calendula.* RUBY-CROWNED KINGLET.
72. *Pinicola enucleator.* PINE GROSBEAK.
73. *Acanthis linaria.* REDPOLLED LINNET.
74. *Passerculus sandwichensis.* SAVANNAH SPARROW.
75. *Junco hyemalis.* SLATE-COLOURED JUNCO.
76. *Spizella arborea.* TREE SPARROW.
77. *Zonotrichia albicollis.* WHITE-THROATED SPARROW.
78. *Passerella iliaca.* FOX SPARROW.
79. *Melospiza georgiana.* SWAMP SPARROW.
80. *Melospiza melodia.* SONG SPARROW.
81. *Calcarius lapponicus.* LAPLAND LONGSPUR.

So far as we know there is no published record of birds from Akimiski Island. This island, the largest in James Bay, has an area of about 900 square miles. At present it is uninhabited, except for the presence of a few wandering Indian trappers during the winter months. We made

two stops on Akimiski, both on the southwest shore. Our first stop was made a short distance east of the middle of this southwest shore on September 18, when we spent much of the afternoon on shore. The next day, September 19, we made a trip inland from the same place and were on shore from 7.30 a.m. until 2.00 p.m. On September 20 we walked twice along three miles of the southwest shore near the western end of the island between 9.00 a.m. and noon. During these three days we observed the following 48 species of birds on or near Akimiski Island:

Branta canadensis. CANADA GOOSE.
Chen hyperborea. SNOW GOOSE.
Chen caerulescens. BLUE GOOSE.
Anas rubripes. BLACK DUCK.
Mareca americana. BALDPATE.
Dafila acuta. PINTAIL.
Nettion carolinense. GREEN-WINGED TEAL.
Glaucionetta clangula. COMMON GOLDEN-EYE.
Melanitta perspicillata. SURF SCOTER.
Oidemia americana. AMERICAN SCOTER.
Mergus serrator. RED-BREASTED MERGANSER.
Circus hudsonius. MARSH HAWK.
Falco columbarius. PIGEON HAWK.
Lagopus lagopus. WILLOW PTARMIGAN.
Canachites canadensis. SPRUCE GROUSE.
Squatarola squatarola. BLACK-BELLIED PLOVER.
Capella delicata. WILSON'S SNIPE.
Totanus melanoleucus. GREATER YELLOW-LEGS.
Pisobia melanotos. PECTORAL SANDPIPER.
Pisobia fuscicollis. WHITE-RUMPED SANDPIPER.
Pisobia bairdi. BAIRD'S SANDPIPER.
Pelidna alpina. DUNLIN.
Ereunetes pusillus. SEMIPALMATED SANDPIPER.
Crocethia alba. SANDERLING.
Larus argentatus. HERRING GULL.
Larus philadelphia. BONAPARTE'S GULL.
Surnia ulula. HAWK OWL.
Asio flammeus. SHORT-EARED OWL.
Colaptes auratus. YELLOW-SHAFTED FLICKER.
Dryobates pubescens. DOWNY WOODPECKER.
Picoides (sp. ?). THREE-TOED WOODPECKER.
Otocoris alpestris. HORNED LARK.
Perisoreus canadensis. CANADA JAY.
Corvus corax. RAVEN.
Penthestes hudsonicus. BROWN-HEADED CHICKADEE.
Turdus migratorius. AMERICAN ROBIN.
Hylocichla guttata. HERMIT THRUSH.
Corthylio calendula. RUBY-CROWNED KINGLET.
Anthus spinoletta. AMERICAN PIPIT.
Dendroica coronata. MYRTLE WARBLER.
Euphagus carolinus. RUSTY BLACKBIRD.
Passerculus sandwichensis. SAVANNAH SPARROW.
Junco hyemalis. SLATE-COLOURED JUNCO.
Spizella arborea. TREE SPARROW.
Zonotrichia albicollis. WHITE-THROATED SPARROW.
Melospiza georgiana. SWAMP SPARROW.
Melospiza melodia. SONG SPARROW.
Calcarius lapponicus. LAPLAND LONGSPUR.

In the case of the Strutton Islands also, we know of no published bird records, so we believe it worth while to list the birds we found there while storm-bound by a strong wind on September 27. We were on West Strutton from 9.00 a.m. until noon, and on East Strutton from 1.00 p.m. until 6.00 p.m. Because of the close association and similarity of these two islands we are not listing separately the birds from each. Thirty-three species are listed:

Phalacrocorax auritus. DOUBLE-CRESTED CORMORANT	6
Branta canadensis. CANADA GOOSE	260
Branta bernicla. COMMON BRANT	7
Chen caerulescens. BLUE GOOSE	25
Anas rubripes. BLACK DUCK	400
Dafila acuta. PINTAIL	5
Nyroca affinis. LESSER SCAUP DUCK	2
Glaucionetta clangula. COMMON GOLDEN-EYE	50
Somateria mollissima. COMMON EIDER DUCK	18
Melanitta deglandi. WHITE-WINGED SCOTER	100
Melanitta perspicillata. SURF SCOTER	5
Oidemia americana. AMERICAN SCOTER	100
Mergus serrator. RED-BREASTED MERGANSER	30
Falco columbarius. PIGEON HAWK	1
Canachites canadensis. SPRUCE GROUSE	3
Squatarola squatarola. BLACK-BELLIED PLOVER	4
Capella delicata. WILSON'S SNIPE	3
Totanus melanoleucus. GREATER YELLOW-LEGS	25
Pisobia melanotos. PECTORAL SANDPIPER	2
Larus argentatus. HERRING GULL	12
Asio flammeus. SHORT-EARED OWL	2
Picoides arcticus. ARCTIC THREE-TOED WOODPECKER	1
Otocoris alpestris. HORNED LARK	150
Perisoreus canadensis. CANADA JAY	6
Corvus corax. RAVEN	2
Penthestes hudsonicus. BROWN-HEADED CHICKADEE	1
Anthus spinoletta. AMERICAN PIPIT	25
Passerculus sandwichensis. SAVANNAH SPARROW	4

Junco hyemalis. SLATE-COLOURED JUNCO . 8
Spizella arborea. TREE SPARROW 100
Zonotrichia albicollis. WHITE-THROATED SPARROW 5
Passerella iliaca. FOX SPARROW 3
Calcarius lapponicus. LAPLAND LONGSPUR 25

On October 4 we spent the morning on Plover Shoals, which is a low-lying peninsula on the east side of Hannah Bay near its mouth and is a part of Hannah Bay Waterfowl Sanctuary, which was established in 1938 by the Province of Ontario. This is a favorite resting and feeding place for thousands of ducks, geese, and shorebirds during the autumnal migration. Our visit was too early for the maximum numbers of waterfowl and too late for the largest concentrations of shorebirds, but it may be of interest to record the 25 species of birds we saw:

Branta canadensis. CANADA GOOSE 100
Chen hyperborea. SNOW GOOSE 150
Chen caerulescens. BLUE GOOSE 3,000
Anas platyrhynchos. MALLARD DUCK 1
Anas rubripes. BLACK DUCK 900
Mareca americana. BALDPATE 7
Dafila acuta. PINTAIL 4,000
Nettion carolinense. GREEN-WINGED TEAL . 400
Glaucionetta clangula. COMMON GOLDENEYE 4
Circus hudsonius. MARSH HAWK 3
Falco peregrinus. PEREGRINE FALCON 2
Charadrius semipalmatus. SEMIPALMATED PLOVER 5
Pluvialis dominica. AMERICAN GOLDEN PLOVER 5
Squatarola squatarola. BLACK-BELLIED PLOVER 5
Capella delicata. WILSON'S SNIPE 1
Totanus melanoleucus. GREATER YELLOWLEGS 50
Pisobia melanotos. PECTORAL SANDPIPER 150+
Pisobia fuscicollis. WHITE-RUMPED SANDPIPER 50
Pelidna alpina. DUNLIN ..... 1,500+
Ereunetes pusillus. SEMIPALMATED SANDPIPER 3
Larus argentatus. HERRING GULL 15
Otocoris alpestris. HORNED LARK 200
Corvus corax. RAVEN 4
Calcarius lapponicus. LAPLAND LONGSPUR 100+
Plectrophenax nivalis. SNOW BUNTING .. 4

In order to make readily available a list of all species of birds that have so far been observed on Plover Shoals, the names of certain species that were observed there by Lewis on September 21-22, 1938, and that are not included in the list immediately preceding are recorded hereunder.

Arenaria interpres. COMMON TURNSTONE.
Calidris canutus. KNOT.
Crocethia alba. SANDERLING.
Colaptes auratus. YELLOW-SHAFTED FLICKER.
Spizella arborea. TREE SPARROW.

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NOTES ON SASKATCHEWAN MAMMALS

By FRANK A. BANFIELD

PUBLISHED data on the Mammals of Saskatchewan are scanty. The earliest published accounts concern the first two Franklin Polar Expeditions. During the first expedition the party wintered at Cumberland House, and in the early spring of 1820, paddled up the Saskatchewan River past Carlton House. During the second expedition, Drummond spent August and September 1825 on the Saskatchewan River on his way to the Rockies. On his return trip Drummond was met at Carlton House by Richardson, where they remained during the summer of 1827. Because of their work in this area Carlton became the type locality for several animal forms characteristic of our western prairies.

During subsequent years the Saskatchewan River formed a highway to the Mackenzie basin, and many explorer-naturalists such as Kennicott in 1859 traversed this route. During the years 1893 and 1894 Tyrell on his explorations about Hudson's Bay passed through extreme northeastern Saskatchewan.

Preble, neither in his investigations of the Athabaska-Mackenzie region, nor of the Hudson's Bay region, actually worked on Saskatchewan soil; but his observations were made in contiguous areas which are faunally similar to northern portions of the province of Saskatchewan.

Edwin Hollis (1902) listed twenty-two species of mammals from the Touchwood Hills noted during a year's residence in this district in 1901. Harper (1932) reported twelve species of mammals collected by the Biological Survey Party at Lake Athabaska in Saskatchewan in 1920.

From the years 1920 to 1932 the annual reports of the Provincial Museum contain lists of mammals collected and observed in connection with ornithological work at summer stations under the direction of the curators, Messrs. Mitchell, Bradshaw and Dunk.

Edwin Hollis (1926) discussed the status of the voles of the genus *Microtus* in Saskatchewan. Soper (1938) has recorded completely the discovery of the Black-tailed Prairie Dog in Saskatchewan at Val Marie in 1929.

Mitchell (1924) published a map indicating the faunal zones recognized in the province. The Hudsonian zone occupies the extreme northern portions of the Province; the Canadian zone occupies the central portion of the province and its southern border swings down in the eaast below Hudson Bay Junction; approximately the southern third of the province is considered to be in the Transition zone. In the extreme southwestern corner of the province there is a suggestion of Upper Austral conditions. Klugh and McDougall (1924), in their outline of the faunal areas of Canada, agree closely with those of Mitchell but include extreme southwestern Saskatchewan in the Campestrian faunal area.

Because of the paucity of published data on the fauna of Saskatchewan, a party including Mr. F. Mowat, Mr. H. Hord and the writer, was organized to make a brief survey with collections of the birds and mammals of the central area of the province. The writer was primarily interested in the mammals. We hoped that this preliminary survey would be an introduction to further work.

Our first Saskatchewan camp was made on June 26th, 1939, at Emma Lake, which is situated forty miles north of Prince Albert and lies on the lower edge of the Canadian zone.

The terrain was found to be gently rolling, with numerous small, shallow, marshy lakes, creeks and muskegs, and generally heavily forested. The predominant trees are Black Spruce (*Picea mariana*), Tamarack (*Larix laricina*), Jack or "Scrub" Pine (*Pinus banksiana*), Poplar (*Populus balsamifera*) and Birches (*Betula*). From this point we made excursions as far north as Montreal Lake, 60 miles further north, lat. 54°.

On July 22 we moved our camp one hundred miles southwest to the North Saskatchewan River, six miles north of Carlton and within a quarter of a mile of the site of old Carlton House. This region is considered to be on the northern edge of the Transition zone. On both sides of the river are prominent wooded hills. To the south stretches the flat Saskatchewan plain, while to the north the cultivated land gradually gives way to the northern forests. The immediate area is characterized by open prairie mostly under cultivation, interspersed with mixed woods — the "bluffs" of the west. Depressions with sloughs are common but mostly of a temporary nature.

On August 7th we broke camp and motored another hundred miles south to Dundurn which is thirty miles south of Saskatoon, and still in the Transition zone. Our camp was situated on virgin rolling, sandy prairie, on which there were numerous poplar bluffs. Sloughs were numerous and at the time of our stay, well filled. The South Saskatchewan River was ten miles to the west. Here we collected from August 7th to the 22nd.

Our last camp site was in the Cypress Hills, in the extreme southwestern corner of the province. The altitude of these hills reaches four thousand feet. They rise out of the flat treeless Sage-bush prairie of southern Saskatchewan and northern Montana, and are covered with a thick growth of Lodgepole or "Northern Scrub" Pine (*Pinus contorta*). From this camp we reconnoitered the slopes and deep wooded coulees of the hills and the prairie from the Alberta border east to Val Marie. We concluded our field work in the province on September 2nd.

Our thanks are due to Mr. F. Dunk, Director of the Saskatchewan Provincial Museum, for his helpful interest. We also appreciate the suggestions of Dr. R. M. Anderson, of the Canadian National Museum, Ottawa, and Mr. E. C. Cross, of the Royal Ontario Museum of Zoology, Toronto.

The following is an annotated list of the Mammals observed and collected in Saskatchewan during the summer of 1939. The data presented are largely based on the collection of one hundred and sixty-six specimens of twenty-eight species. The measurements are the average of adult specimens. They are recorded in millimeters in the following order: length, tail, and hind foot. The numbers in brackets are the largest and smallest measurements recorded for each species. Pregnancy ratios are also recorded when determined.

It was considered inadvisable to attempt racial studies on the collection secured. More material from Saskatchewan and contiguous areas must be secured before satisfactory studies of this kind can be made. The mammals have, therefore been treated under a binomial nomenclature with occasional comment in the text on subspecific probabilities.

The nomenclature is that of Miller's List of N.A. Recent Mammals (*U.S. Nat. Mus. Bull.*, 128 1924) except in the following cases in which we have followed the authors indicated.

Sorex cinereus	JACKSON. *N. A. Fauna,* 51,
Sorex arcticus	1928.
Mustela frenata	HALL. *Carnegie Institution*
Mephitis mephitis	*of Washington,* Pub. No. 473, 1936.
	HALL. *Univ. Calif. Pub.*
Ursus americanus	*Zool.,* Vol. 30, No. 10, 1928.
Tamiasciurus	HOWELL. *N. A. Fauna,* 56, 1938.
Clethrionomys	PALMER. *Proc. Biol. Soc. Wash.,* 41, p. 87, 1928.

Sorex cinereus. CINEREOUS SHREW.—This shrew was encountered only at the Cypress Hills where a single specimen was secured on August 30. The measurements are: L. 79, T. 31, HF. 10. sex uncertain. The skull measurements and pale colouration suggest that it is referable to *S. c. haydeni* which is the ascribed form for the southern portion of the province.

Sorex arcticus. SADDLE-BACKED SHREW.—Our trapping records suggest that shrews were at a low ebb in numbers at all our collecting stations. Only two specimens of the Saddle-backed Shrew were obtained at Emma Lake. Both were secured in the willow borders of spruce forests. A male measured: L. 118, T. 42, HF. 14, while a female measured: L. 112, T. 43, HF. 13.

Sorex obscurus. DUSKY SHREW.—In Saskatchewan this species is confined to the open pine ridges of the Cypress Hills where it is the dominent insectivore. Three specimens secured here in late August averaged: L. 109 (105-116), T. 45 (44-47), HF. 13. None were pregnant.

Courtesy of National Parks Bureau, Ottawa.

CANADIAN ZONE FOREST, NORTHERN SASKATCHEWAN.

SAGE-BRUSH PRAIRIE, SOUTHERN SASKATCHEWAN. (From Soper)

Myotis lucifugus. LITTLE BROWN BAT.—A specimen of this species was examined at the Cypress Hills on August 23 where it had been killed in a shed several days previously.

Lasionycteris noctivagans. SILVER-HAIRED BAT.—This bat was encountered only at Dundurn where a single specimen was collected on August 14 as it flew about a farm clearing. Bats were common at all our collecting stations but no satisfactory means of collecting them was found.

Nycteris cinerea. HOARY BAT.—Bats probably referable to this species were observed on several nights at both Carlton and Emma Lake, suggesting that they are not uncommon. One lactating female was collected over the grassy shoreline at Emma Lake on July 5.

Ursus americanus. BLACK OR CINNAMON BEAR.—Black bears were observed and their tracks noted about Emma Lake and Prince Albert National Park.

Mustela cicognanii. BONAPARTE WEASEL.—On July 13 between eight and ten Bonaparte weasels were congregated in a willow clump on the edge of a grassy meadow at Emma Lake. A female collected at this time measured: L. 250, T. 76, HF. 38.

Mustela frenata. LONG-TAILED WEASEL.—A weasel of this species was observed on the banks of the South Saskatchewan River at Saskatchewan on August 17.

Mephitis mephitis. STRIPED SKUNK.—Skunks were noted regularly throughout the province. On the afternoon of August 23 at Divide in extreme southwestern Saskatchewan two skunks were observed hunting over the sage brush plains without any apparent adequate cover.

Canis latrans. NORTHERN COYOTE.—Coyotes were seen regularly throughout the province and more especially in the less populous prairie districts.

Canis nebrascensis. PRAIRIE COYOTE.—A five-months-old pup taken from a den near Neidpath was examined on August 23 and seemed to be referable to this species. The collar was clear buff and the general tone was pale.

Marmota monax. WOODCHUCK.—This mammal was encountered commonly throughout the forested central part of the province as far south as Carlton, where we were told it had appeared in recent years and was increasing.

Citellus richardsonii. RICHARDSON'S GROUND SQUIRREL.—This characteristic plains mammal was found commonly throughout southern Saskatchewan and north into the Canadian zone as far as Emma Lake where it was confined to the roadsides. A series of nine adult males from the type localaity, Carlton, averaged: L. 296 (280-312), T. 76 (71-80), HF. 48 (43-50), while six females also from the type locality averaged: L. 276 (270-285), T. 71 (66-78), HF. 42 (40-43); suggesting a sexual difference in size. None of the females were pregnant.

Citellus franklinii. FRANKLIN'S GROUND SQUIRREL.—This ground squirrel was found to be less common than *richardsonii.* Their two habitats were found to be quite distinct. *Richardsonii* inhabited the roadsides and open rolling prairie while *franklinii* showed a preference for the poplar bluffs, and in the north the forest edge. A trap, however, placed at a tunnel entrance on the river bank at Carlton yielded a *richardsonii* and a *franklinii* within half an hour on July 28.

At Emma Lake sunken and subterranean runways across grassy meadows were frequently used by this mammal. This species was encountered from Prince Albert National Park south to Dundurn.

A series of six adults from the type locality and seven from Emma Lake averaged: L. 363 (310-402), T. 132 (116-150), HF. 52 (50-55). There was apparently no sexual difference in size. None of the females were pregnant.

Citellus tridecemlineatus. THIRTEEN-LINED GROUND SQUIRREL.—Although the least common of the three ground squirrels, we found it to have the widest range. We noted it from Estevan to the Cypress Hills in the south, and north to Montreal Lake. It also showed the widest range in habitat, from the open sage brush plains and poplar bluffs of the south, to the forest edge and roadside clearings in the north. Specimens were obtained at all our stations. Four adults averaged: L. 284 (265-275) T. 99 (92-103) HF. 37 (37-38). No female was pregnant.

Cynomys ludovicianus. PRAIRIE-DOG.—While motoring along the southern border of Saskatchewan from Alberta eastward to Val Marie we enquired about the presence of prairie dogs on August 23 and 24. At Climax we were told of a "dog-town" near Treelon, but we could not spare the time to investigate. At Canuck we visited a farm where up until three summers before there had been a small town consisting of about twenty animals.

We actually encountered the prairie dog only at the large town on the Frenchman River seven miles southeast of Val Marie; the colony which

Soper (1938) fully described. We found the colony flourishing but succeeded in obtaining only one specimen, a female which measured: L. 368, T. 79, HF. 59.

Eutamias minimus. WESTERN CHIPMUNK.—This mammal was a characteristic denizen of the forested areas of the province. It was found to be very common at Emma Lake and Carlton where it inhabited the roadside clearings and forest glades. At Dundurn only one individual was noted. A series of six adults from Emma Lake measured: L. 204 (228-194), T. 97 (92-103), HF. 32 (30-33).

Tamiasciurus hudsonicus. RED SQUIRREL.—The Red Squirrel, so characteristic of the forested central and northern areas, was not found in the poplar bluffs of the southern portions of the province. At Emma Lake and Carlton this mammal was very common. Several specimens taken in late June and early July at Emma Lake, still possessed patches of winter pelage. Three of these specimens were lactating females but none were pregnant. A series of thirteen adults from this station averaged: L. 309 (285-330), T. 129 (119-138), HF. 50 (47-50).

Glaucomys sabrinus. NORTHERN FLYING SQUIRREL.—Although only one specimen was secured at Emma Lake on June 30 measuring L. 334, T. 155, HF. 40; the animal undoubtedly occurs regularly in the northern forests. Local trappers complain of their regular appearance in traps set for fur-bearers during the winter months.

Thomomys talpoides. EASTERN POCKET GOPHER.—The surface mounds of this mammal were seen commonly throughout the southern prairie. It was noted that the Pocket Gopher showed a decided preference for the damp rich soil on the slough edges. We found the species ranging north into the southern border of the Canadian forests. We were told of several "mole" colonies along the C.N.R. line a short distance west of Prince Albert, while we had a Pocket Gopher described to us which had been trapped from a mound in a garden at Christopher Lake forty miles north of Prince Albert. Although the animal was apparently common, specimens were secured with difficulty. Two topotypes from Carlton measured: L. 239, T. 76, HF. 26, and L. 229, T. 70, HF. 27. Both were females but neither was pregnant.

Castor canadensis. BEAVER.—Beavers are common and apparently increasing, and spreading in the region of Prince Albert National Park. At Emma Lake we examined a house and trails which had been used up until the spring of 1939. About this site poplars up to twelve inches in diameter had been felled by the beavers.

Onychomys leucogaster. GRASSHOPPER MOUSE.—A single specimen of this mouse was collected at Carlton, Dundurn, and the Cypress Hills. We noted that the Grasshopper Mouse showed a preference for ground squirrel and gopher tunnels on the open prairie. Three females averaged: L. 141 (134-147), T. 39 (37-43), HF. 22 (21-22). A female secured on August 30 contained three embryos.

Peromyscus maniculatus. WHITE-FOOTED MOUSE.—This species occurred abundantly at all our stations and exhibited a wide choice of habitats. Specimens were trapped from the arid sandy prairie, poplar bluffs, to the deep mossy spruce bogs of the north. The thirty-six specimens collected show great physical diversity.

At Carlton and Emma Lake a large richly coloured form was met. The average measurement gave: L. 171 (162-180), T. 76 (69-79), HF. 20 (21-19), for ten adults. This corresponds to *P.m. borealis.* Associated with this form in the same habitat was another race characterized by smaller size, shorter tail, possessing a heavy dark medium dorsal line, and generally heavily sprinkled with black on the flanks. Eight adults of this form averaged L. 154 (150-159), T. 68 (66-71), HF. 20 (19-21), which suggests *P.m. bairdii.*

The poplar bluffs of the southern prairie were also inhabited by a small dark form probably referable to the same subspecies. Eight adults from Dundurn averaged: L. 144 (138-159), T. 61 (53-65), HF. 20 (19-21).

A pale form was found on the high prairie plateaus of the Cypress Hills. In loose sod on the prairie we noted many entrances to tunnels leading to grass-lined nests. From these sites were obtained specimens apparently of *P.m. osgoodi.*

Synaptomys borealis. LEMMING MOUSE.—On July 3 a Lemming Mouse was secured from the edge of a grassy flat bordering a small marshy bay of Emma Lake. The specimen, an adult male, measured: L. 120, T. 20, HF. 18. This I believe constitutes the first record of this mammal for the province.

Phenacomys mackenzie. MACKENZIE PHENACOMYS.—A small series of five Phenacomys was secured at our camp on Emma Lake, as follows:

July 3, female L. 140, T. 33, HF. 17, Adult.

July 9, female L. 121, T. 30, HF. 17, Sub-adult, pregnant.

July 10, male, L. 110, T. 26, HF. 17, Immature.

July 17, female, L. 142, T. 31, HF. 17, Adult pregnant.

July 18, male, L. 130, T. 31, HF. 17.5, Immature.

These mammals were all collected from essentially the same habitat. Three were taken from brush piles and logs on the edge of the deep, dry spruce woods; and two from willow clumps between the grassy glades and the spruce woods. Contemporary mammals closely associated with this habitat were the following: *Sorex arcticus, Peromyscus, Clethrionomys* and *Microtus drummondi.*

The specimens trapped on July 3 and 17 show the typical adult pelage described by Howell (1926), while the remaining specimens are the typical dull juveniles. The female collected on July 9 although exhibiting the juvenile pelage was sexually mature and carried four well-developed embryos. The other pregnant female carried the same number.

This series, I believe, constitutes the second record for the province and also shows a four hundred mile southward extension of the range to the base of the Canadian zone. Harper (1932) recorded the taking of four *Phenacomys mackenzii* at Crackington Point, Lake Athabaska, in 1920.

Clethrionomys gapperi. RED-BACKED MOUSE.—An abundant mammal at all our camps, this mouse inhabited in the north the dense spruce forest, while juveniles were found wandering into the bordering willows. On the prairie it was confined to the poplar bluffs and wooded coulees. It was also a denizen of the pine ridges of the Cypress Hills. A series of fourteen adults from the province measured: L. 144 (136-152), T. 39 (32-44), HF. 19 (17-19).

Three females contained seven, seven, and five embryos out of seven females from July 10 to August 18.

Microtus drummondi. DRUMMOND MEADOW MOUSE.—At Emma Lake we found this mammal in the forest glades and marshy marginal flats about the small lakes. A series of twelve adults from this station averaged: L. 158 (146-175), T. 48 (39-55), HF. 19 (18-20).

Between July 4 and 20 four of six females taken were pregnant and carried an average of five embryos.

At the Cypress Hills the mouse was found inhabiting the open dry ridges and damp spring sources.

Microtus minor. LEAST MEADOW MOUSE.—On August 13 a male was found dead on the open prairie at Dundurn. Its measurements were: L. 142, T. 32, HF. 17.

Ondatra zibethica. MUSKRAT.—This mammal was found to be fairly abundant on the shallow marshy lakes and sluggish streams of the lower Canadian zone. At Dundurn we also noted signs of habitation on the larger permanent sloughs.

Mus musculus. HOUSE MOUSE.—On the evening of August 24 a Short-eared Owl (*Asio flammus*) shot from the side of the road near Val Marie had a house mouse clutched in its talons. There were no buildings within half a mile. No others were seen.

Rattus norvegicus. HOUSE RAT.—Rats were noticed on the banks of the Saskatchewan River at Saskatoon.

Zapus princeps. SASKATCHEWAN JUMPING MOUSE.—At Emma Lake this species occurred uncommonly in the tall grass at the edge of grassy flats. It was also noted at Carlton. A series of five adults averaged L. 220 (213-227), T. 130 (125-135), HF. 31 (30-33). Neither of the two females was pregnant.

Lepus americanus. VARYING HARE.—This mammal was apparently at a low ebb in numbers about our stations in 1939. We noted hares on only two occasions in the heavily forested, lower edge of the Canadian zone at Emma Lake. Both these specimens were collected, the female measured L. 447, T. 61, HF. 125 and the male L. 406, T. 54, HF. 131.

Lepus townsendii. WHITE-TAILED JACK RABBIT.—Jack Rabbits occurred commonly over the Saskatchewan plain, abundantly in the south and less common northward. No individuals were noted north of Duck Lake. The White-tailed Jack Rabbit is most active after sundown when it is commonly met on all the roads. Cars exact a high mortality on this species as shown by numerous bodies on all western roads. On several occasions we followed these jack rabbits in a car for distances up to a quarter of a mile; and by keeping them in front of the head lights we found they travelled at a steady rate of 23 m.p.h. Three adults measured L. 541 (523-571), T. 91 (83-99), HF. 138 (129-145).

Sylvilagus nuttallii. COTTONTAIL.—According to residents this mammal is spreading steadily northward into the province. It seems to favour the small bluffs, river-beds and coulees. Cottontails were noted about the Cypress Hills while a specimen was collected on the banks of the South Saskatchewan River near Dundurn on

August 16. A male, it measured L. 409, T. 55, HF. 115.

Odocoileus hemionus. MULE DEER.—On several occasions Mule Deer were observed on the roads in Prince Albert National Park. The hunters know only one species of deer from this region.

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*THE MONARCH BUTTERFLY, Danaus archippus Fab. I. GENERAL OBSERVATIONS IN SOUTHERN ONTARIO**

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1. INTRODUCTORY

WITH THE purpose of securing an understanding of the migration of insects generally, observations were made on the salient features of the behaviour of the migrating monarch butterfly, *Danaus archippus* Fab. Most of the observations were made in Kent and Essex, the two most southerly counties of Ontario, and some other observations were made at various points, particularly Belleville on Lake Ontario, in southern Ontario. The observations were continued from August 1934 to the end of 1940.

The monarch breeds in Ontario and manifestly, as is shown by Williams (1930 and 1938), flies south each autumn. In the region of observation such flights were seen through September and as late as the middle of October. The latest a monarch was ever seen was October 28, in 1936. Records of a returning, northward, migration are scarce, but some have recently been collected by Williams (1938). In the present study, the earliest monarchs were usually seen during the first week in June, but in 1940 they appeared on May 16. During the autumnal migration, nocturnal aggregations are often formed, particularly in the vicinity of the Great Lakes. Such aggregations were generally found on the shore of Lake Erie by about August 24 and were observed during September.

* Contribution No. 2,073, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

In 1934, the monarch appeared in unusual numbers, both in southwestern Ontario and throughout a large part of eastern Canada, generally. Thus it was seen in 1913 and 1922, in Kings county and York county, New Brunswick by R. P. Gorham,* who watches for it, (by correspondence he also reports having seen it again in 1935); again unusually, the monarch was abundant in the Aylmer district of Quebec according to C. B. Hutchings*; finally, it was unusually common in southern Quebec and eastern Ontario according to G. H. Hammond*. Further, in Connecticut, Britton (1935) states that the monarch was uncommonly abundant. The numbers present in southwestern Ontario, during 1934, may be judged from the fact that on September 14, 2,000 monarchs were present in one field of 2 acres of flowering buckwheat near Chatham, in Kent county, Ontario. In the years 1935 to 1939, the monarch was comparatively rare. In 1940, few monarchs were seen early in the season but in September very great numbers appeared in southwestern Ontario, apparently in migration; thus on September 15, they passed along the beach, about 100 ft. wide, at Pt. aux Pins, (42° 15'N, 81° 50'W.) on Lake Erie, for many hours at the rate of 200 or 300 a minute. They are also reported to have been abundant in the Niagara peninsula by R. W. Sheppard*.

2. Sexual Maturity

From both superficial observations and from dissections, it was found that the population in the summer consisted largely of old and sexually mature butterflies, but that at the time of the autumnal migrations of immature butterflies. Thus, the monarchs seen from the beginning of June until the middle of August were often battered and worn and were frequently found copulating. After August, they were practically all singularly fresh and unrubbed and among the vast number of monarchs seen, particularly at the lake shore, in the 7 years of observation, only 4 times, on September 1, 1935, on September 8, 1936, on September 10, 1937 (2 pairs) and on September 2, 1940, were they seen in copulation. During September and October, while the monarchs were flying out over the Great Lakes, there occurred repeatedly a movement which if observed ordinarily in the field would have been considered sexual pursuit; copulation was, however, never effected. It appeared that old butterflies occur in Ontario during the spring and early summer but that later the population consists of butterflies recently emerged at no great distance and that these do not remain to be battered or to become mature sexually.

The foregoing observations were supplemented by the comparison of the development of the genital parts of monarchs taken from clusters formed in the autumns of 1934 and of 1935, with the parts from monarchs collected on July 20, 1935 when copulation was very frequent. Both sexes taken from the autumnal aggregations were full of fat, even in the anterior part of the abdomen. In the aggregating females the copulatory pouch was small and flat, whereas in the females of the summer, it was large and distended into two parts; in the former and the latter the spermatheca was of about the same size; in the former the ovarian tubes were thin and tapering, whereas in the latter, eggs were numerous. In aggregating males, the testes were about .75 mm. in diameter, whereas in the males of the summer they were about 1 mm.; in the former the tubes leading away from the testes, i.e., the vas deferens or seminal vesicle, were slight and obscure and were buried in fatty tissue, whereas in the latter these tubes were large and convoluted.

A question arises of whether the sexual immaturity of the monarchs found in the autumn is fundamental to migration. It may be that southward migration merely coincides with the occurrence of a new generation for which, according to Scudder (1889), eggs do not mature for about a month. Our hesitance to pronounce on such a point is increased when we note that Williams (1930: 349) has shown that of many species of migrating butterflies, some are immature and some mature.

3. Torpidity of Migrants

At the time of the autumnal migration the monarchs were found to be strangely torpid, apparently as a result of fatigue; they were not startled when approached and could be taken easily. Such torpidity was noticed particularly on September 13, 23 and 28, 1934, on August 31 and September 18, 1935, and on September 19, 1940, on the part of monarchs which had interrupted their linear flight across country to drop on a blossom and feed. As an instance of this behaviour, the observation of September 23, 1934, when the day was warm and bright, will be reported. Three monarchs crossed the Thames River from north to south and of these two flew

* The Canadian Insect Pest Review of the Dominion Department of Agriculture. Vol. 12, No. 4, 1934.

* The Canadian Insect Pest Review, Vol. 18, No. 4, 1940.

straight on south, but the third went to a goldenrod plant, which it worked for 20 minutes. At the end of that time, the writer picked it and another monarch up by hand. They did not struggle when picked up, but when they were released they flew away rapidly and erratically. Yet, the behaviour during the same period at Pt. aux Pins and Pt. Pelee, (42° N., 82° 30' W.) on Lake Erie, of monarchs, coming in the morning from clusters which had been formed at sunset, was in marked contrast to the torpid behaviour of those observed in migration, for one had the greatest difficulty to catch the former with a net. Approaching the matter of the torpidity of the monarch simply, one would say that during the migration they may become very tired, but that after spending the night on a tree they are refreshed.

The foregoing view-point is supported by observations made at Pt. Pelee, towards the end of the day. To illustrate the matter, some observations made on September 15, 1935, at the tip of the point, will be presented. On this day, at about 11.00 a.m., the monarchs were generally drifting southward, out over Lake Erie, as they flew northward in the face of a very strong northwest wind. Often as they drifted out they seemed to make a great effort and gain the lee side of isolated willows where they settled. The monarchs in flight were difficult to catch, but when settled they were extremely lethargic and the writer was able to pick by hand, 14 out of 18 on one bush. These clusters were apparently formed on account of the fatigue of the butterflies. The writer has found no reference to such phenomena of fatigue in the literature on this or any other migrating butterfly.

4. THE INCIDENCE OF CLUSTERS OR AGGREGATIONS

It does not fall to our lot to record any of the spectacular aggregations or clusters of monarchs settled on trees to which there is frequent reference in the literature, but we can present some information on the incidence and magnitude of the more common smaller clusters, which can apparently be seen day after day, in such years as 1935 and 1940 when monarchs are numerous and which appear not to have attracted much attention. We choose to define an aggregation as a group of 5 or more monarchs at rest together. Frequently, though hundreds were seen, as in one of two groups of clusters seen on August 31, 1935, at Pt. aux Pins, when for about half a mile along the edge of a pine wood there were clusters, averaging 12 monarchs, at intervals of about 30 ft.; altogether, there were about 1,000 monarchs present and such abundance was quite usual in that year. Aggregations were seen at 42 times and places in 1934, 1935 and 1940, were seen thrice in 1936 and 1937, but were not seen at all in 1938 and 1939. These records.* no doubt, are a most incomplete report of the aggregations formed in the region and time involved, but indicate how frequently aggregations happened to be seen even in the course of occasional excursions to the shore of the Great Lakes.

5. THE PLACE AND TIME OF AGGREGATIONS

In the region under consideration, it was the experience in the present study, and has been the general experience as summarized by Williams (1930), that the aggregations occur on the north shore of Lakes Erie and Ontario during the autumnal migration. Accordingly, there is a natural tendency to assume that the aggregations are an integral part of the phenomenon of migration and that the lakes serve either as a gathering place for migrants or as a barrier to migration. Observations were made with the purpose of testing these assumptions.

In connection with the apparent association of aggregation and migration, it was hoped to find whether the monarch formed aggregations at night throughout the year. Even in 1935, however, when there were more monarchs than in subsequent years, there were too few to hope to find aggregations before August when they were possibly already in southward migration. (The writer himself did not see an aggregation reported at Cape Rich on August 4, 1935). At that time, near Chatham, the following aggregations were observed: on August 10, 5 monarchs and on August 15, 10 monarchs. On August 10, 1940, another such aggregation, of 6 monarchs, was seen. These monarchs showed all the usual signs of aggregation, there was settling, rising and resettling close to one another. Of the 21 monarchs mentioned, however, 6 were in copulation and in this respect the groups differed radically from the autumnal aggregations and thus were probably not migrants. We believe that here we have some evidence that the breeding, non-migrant population may form aggregations if it is sufficiently dense.

In connection with the apparent association of aggregation with the Great Lakes, a close

* The record of the time and place when aggregations or clusters were found to have been formed has been prepared as a supplementary table, I, which may be obtained from the writer on request.

watch was kept for aggregations inland. Of the 45 aggregations mentioned at the beginning of this section, 9 were found away from the Great Lakes, although the entomologists who made the observations naturally spent most of their time inland. Similarly, on all days during late August and September when the writer went to the lake shore in 1934 and 1935, aggregations were found but only 5 times during these years were monarchs observed settling on trees in or near the town of Chatham. Clearly there is a marked tendency for the butterflies to aggregate by the water. Three exceptions to the characteristic aggregation on the north shore of the lakes were observed on September 14, 1934, near Big Point, on Lake St. Clair, i.e., on the eastern side of a lake: on (*sic*) August 4, 1935, at Cape Rich, on Georgian Bay (Lake Huron), where the shoreline runs generally northwest: and at the beginning of September, 1935, near Kettle Point on Lake Huron, where the shore-line runs generally west of southwest. In the case of these two exceptions where the lakes did not bar southward flight there is a suggestion that the monarchs were attracted by the lakes.

6. The Height of Flight During Migration

Although the monarch is shown by Williams (1930) to be peculiar among butterflies in that it often migrates at a considerable height, our observations do not generally illustrate this tendency. Most of the monarchs observed over land in linear flight, i.e., flying in some definite direction, during the autumns, 1934, 1935 and 1940, of abundance, moved between 4 to 10 ft. from the ground. The level of flight was apparently determined by objects at some distance, thus it was noticed in 1934, that, in crossing the Thames where the banks are bluffs of about 30 ft. and the river is about 100 ft. wide, the butterflies maintained their level of flight from one bank to the other. In general, the monarchs rose when they approached a row of trees or of buildings. For a row of trees about 60 ft. high, they commenced to rise as much as 120 ft. in advance. On only 2 days in 1934, 1 day in 1935 and 2 days in 1940, were monarchs seen far above the tree tops (where they held a remarkably steady southerly course). These days were overcast and possibly on brighter days the monarchs high in the air could not be seen. Once a monarch which had been travelling fairly close to the ground was seen to rise when it came to a row of trees and it then joined a group of 3 at a height of about 100 ft. The monarchs were most often seen to rise, as is discussed in Section 9, when they took off over the Great Lakes. The keeper of the Southey Shoals Lighthouse, 7 miles off Pt. Pelee, estimated the height above the lake of all monarchs seen as from 10 ft. to 80 ft., with a mean of 36 ft.

7. Flight out over the Great Lakes as affected by the hour of day

Perhaps the most spectacular phase of migration is the departure of the monarch over the Great Lakes. Of this phase we propose to deal at the moment with the part played by the hour of the day. In general, the southerly flight out over the lakes started at about 7.30 a.m., maximized at 11.00 a.m. and continued into the early afternoon when a less marked reverse northerly flight in from the lakes occurred. Two of several examples will be presented. First, at Pt. Pelee on September 15, 1935, with a continual brisk northwest wind, at 11.00 a.m., the monarchs left the spit at the net rate of 43 a minute, i.e., 867 south and 434 north in 10 minutes; by 12.30 the numbers had diminished greatly and by 5.00 p.m., they were moving north at the net rate of 3 in 2 minutes, *i.e.*, 11 south and 25 north in 10 minutes. Second, at Pt. aux Pins on September 12, 1936, with a light southerly wind, in the forenoon monarchs passed southward over the water, but in the afternoon the flight was inshore, for from 3.10 to 3.30 p.m., 2 monarchs went out and 15 came in and from 3.45 to 4.05 p.m., 2 went out and 9 came in.

Although there seems to be no mention of this phenomenon of reversed flight late in the day for monarchs, it is not surprising since Williams (1930: 322) discusses such return flights of migrating butterflies and sums up evidence for *Vanessa cardui* L., *Catopsilia statira* Cramer, *Urania leilus* L. and *Delias* spp. Williams (1930: 192) draws attention particularly to the reversal of flight in the case of the painted lady, *Vanessa cardui,* off the coast of Palestine in 1917. These butterflies went out to sea early in the day and later in the day came in, however they moved against a northwest wind early in the day and a southeast wind later.

We have, unfortunately, no data bearing on a possible cessation or reversal of migration over land with the advance of the day, but only an impression that some effect of that sort occurred. It is possible, however, that a difference, of the sort treated in Section 9, in the intensity of such an effect over land and water may be responsible for the occurrence of a population sufficiently

dense to form aggregations near the shore of the Great Lakes generally and on capes in particular, in that monarchs arriving, say, at the capes late in the day tend to accumulate for a flight the next morning. Such aggregations were noticed particularly on Pt. Pelee, Pt aux Pins and also on Pt. Peter, (44° N., 77° W.) on Lake Ontario.

8. The effect of wind on the flight across the Great Lakes

Since there is some question of how far the movement of the monarch is voluntary, we may profitably record the conclusion that the flight out over the lakes took place with the wind as often contrary, *i.e.* southerly, as with the wind following, although the manner and the hour of the flight were apparently affected by the direction of the wind. This conclusion is based, first on occasional observations,* including records of wind velocity, at 5 ft. from the ground (all records were made on the north shore of the lakes) and secondly on regular observations** made by the coxswain of the Pt. Pelee Lifesaving Station in 1935 near the tip of Pt. Pelee.

From the series of occasional observations made mainly during 1935 and 1936 at Pt. Pelee, on which the foregoing conclusion is based, it is impossible to report in detail more than four. First, consider the behaviour of monarchs when a moderate southerly wind was blowing, that is a wind apparently unfavourable to migration. Among the flights that occurred under these conditions were two in the mornings of September 12 and 13, 1935, on each of which monarchs were leaving the tip of Pt. Pelee at the net rate of 27 a minute, by this is meant that, for instance, on the second day, 375 went south and 15 went north in a count of 13 minutes. Next consider the behaviour when a northerly wind was blowing, that is a wind apparently favourable to migration. Among the flights that occurred under these conditions were two, the first in the afternoon of September 13, 1935, when monarchs were again leaving the tip of Pt. Pelee at the net rate of 20 a minute, *i.e.*, 337 south and 43 north in 15 minutes, and the second in the morning of September 15, 1935, when they were leaving the tip at the net rate of 43 a minute, *i.e.*, 867 south and 434 north in 10 minutes. While monarchs left Pt. Pelee going south or southwest with either a head wind or a following wind, there was some difference in the manner of their going under these two circumstances. With a head wind they progressed more happily, travelling low with a high degree of unanimity. With a following wind the southerly movement was accomplished at a much greater height by butterflies drifting backwards and this movement was offset to some extent by a northerly movement which took place close to the water or the ground.

Williams (1930) shows in his Figure 69, which summarizes a great many observations on the migration of butterflies, more flights with or against the wind than across it and he thinks this "a psychological error" of the observers. The observations just discussed on flight out over the Great Lakes, however, suggested to the writer that the monarch tends either to go out against the wind or else to be blown back by it so that the flight does indeed tend to be in the line of the wind.

Twice at Pt Pelee the normal progression, with the advance of the day, in migration, as discussed in Section 7, seemed to be interrupted by a change of wind, when there occurred a great flight in the late afternoon. First, on September 13, 1935, at 11.00 a.m. monarchs were leaving the spit at the net rate of 27 a minute, by 12.30 were leaving at the rate of 6 a minute, and normally on such a day would shortly have discontinued or reversed their flight; the light southwest wind, which had previously prevailed, turned about 3.00 p.m., however, to the northeast and the flight was renewed at the net rate of 20 a minute. Second, on one day, September 22, 1935, the observing coxswain of the Lifesaving Station saw a flight out over the lake in the afternoon and he recorded that on that day a west wind of the morning changed to a north wind in the afternoon.

9. Differences in migration over shore and lake

During the autumnal migration, monarchs seemed to hug the shore, but when they did pass out over the lake they plunged boldly to the south. This surprising difference was not noticeable at Pt. Pelee where the shore-line runs practically north and south, *i.e.*, in a direction close to that of migration, so that the butterflies tended

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* The occasional observations made most carefully on flights from the land out over the Great Lakes have been summarized as supplementary table, II, which may be obtained from the writer on request.

** The records for 1935 of the number of monarchs about the station, the number seen crossing the lake and the direction of their flight, together with observations on the meteorological conditions have been prepared as a supplementary table, III, which may be obtained from the writer on request.

to go down to the tip and straight out over Lake Erie. Pt. aux Pins, however, does not end sharply but, on the east side runs roughly north and south for some way and then curves back to the mainland; this topographical difference seems to influence the behaviour of the monarchs, as witness several observations from which we have chosen two for illustration, made where the shore of Pt. aux Pins runs to the southwest. First, on August 26, 1934, with a southwest wind of about 8 miles an hour, all the morning, monarchs moved near the edge of the water within a few feet of the ground into the teeth of the wind. Continually, however, some drifted out over the water and once they were a little way from the shore their behaviour changed radically. In the first place, they gained height very rapidly and in the second place, they moved due south or even east of south. Second, at the same place on the morning of September 1, 1935, with a north wind of about 8 miles an hour, the most common movement at the water's edge was slowly northeast at 2 to 7 ft. into the wind. Continually, some turned east over the lake and then shortly turned south. The monarchs almost all rose to at least 40 ft. as soon as they went out over the water; such rising was most marked on days when there was a following wind. In both these cases, the movement over the shore was influenced by the wind and not in the same direction as that over the water, where the flight was consistently southerly.

10. Migration and population level

The observations of the present study suggested that migration of the monarch did not depend, as is supposed to be the case for locusts and some other animals, on the occurrence of a great population. Apparently, the first necessary condition for migration was not multiplication as is implied by Williams (1930: 326). Migration of the monarch appears to have been casually associated with abundance because the incidental nature of most of the observations made on migration has resulted in many notes on the behaviour when great numbers of the butterfly were present. Thus, there is a general tendency for writers, like Webster (1912) who speaks of "bands" of monarchs moving across country and reappearing from place to place, to regard the monarch as migrating in groups, and to imply that groups are essential for migration. In the present study, the movement of coherent groups like flocks of birds was not seen the most that could be said was that when large numbers of monarchs were moving, say, along the shore, if one went by then several probably did so, and it could doubtlessly be shown statistically that their occurrence was not independent. Apparently the monarchs travelled individually down to the shore of the Great Lakes where they might fall into groups at places such as Pt. Pelee.

Although, as is discussed in Section 4, monarchs were so scarce that few aggregations were observed in the years 1936 to 1939, the occurrence of groups was quite secondary to migration which still occurred and was carried on in a thin stream in the same way as by a dense one, as witness served in the years 1936 to 1939, the occurrence 1938, great numbers still appeared in September and October at Pt. Pelee as reported* from the Lifesaving Station. Monarchs do not breed in great numbers at Pt. Pelee, indeed it was almost impossible to find in southwestern Ontario the immature stages of the monarch, even in places where the adults were numerous, copulation frequent and the food plant, *Asclepias syriaca* L., present for in the years 1935 to 1938, repeated and prolonged searches yielded only half a dozen larvae. Accordingly, the records at the Point indicate clearly a congregation by the lake and presumably indicate the occurrence of migration, in those years when monarchs were scarce. Second, in the same vein, generally during the autumn of the years 1936 to 1939, along the shore of Lake Erie between Pt. Pelee and Pt. aux Pins the monarchs appeared in some numbers, as during the last two weeks of September 1938, when they were seen every day there in scores, although not sufficiently numerous to form clusters, and when the writer was impressed that there was a thin movement to the southwest. At the same time, one might drive 50 miles inland and see none. Third clear-cut evidence of migration during 1938 appeared when drowned monarchs were washed up on Pt. aux Pins on October 13; there were 4 or 5 monarchs to 100 ft. of beach.

11. Summary

Records made during the years 1934 to 1940 on the appearance, migration flights, aggregations and disappearance of the monarch butterfly, *Danaus archippus* Fab., have been summarized. The entire population in the autumn was fresh

* The records of the number of monarchs seen about the station have been prepared as a supplementary table, IV, which may be obtained from the writer on request.

and sexually immature; a similar condition has been observed in some other butterflies which migrate. The monarch is subject to a peculiar torpidity, apparently resulting from exhaustion, during migration. This butterfly, like others, tends to reverse the direction of its migration towards the end of the day. The migration over water differed from that over land, in particular, it was bolder. It was impossible to decide whether these butterflies aggregated, as they did, mainly by the Great Lakes because their movement was barred or because they were attracted there. A marked feature of the flight over the lakes was the tendency of the monarch to move, contrary to the general assumption, into the wind when migrating. The migration occurred independently of any pressure of population.

12. Acknowledgements

The present study was suggested to the writer by Dr. C. B. Williams who made further suggestions as the work progressed. Especial acknowledgements are due Mr. H. G. James of the Dominion Parasite Laboratory at Belleville, to whom many records in that region are due. Dr. C. C. Bell and the late Mr. J. H. Smith of Chatham, Ontario, contributed many observations. Continuous and valuable observations have been reported by the staff, Dr. G. M. Stirrett and Messrs. D. A. Arnott, W. E. Lindsay, H. B. Wressell, A. A. Wood and G. E. Coppel of the Dominion Entomological Laboratory at Chatham. Valuable records were made in 1935 by Mr. W. A. Grubb, coxswain of the Pt. Pelee Lifesaving Station and extremely valuable records by his successor, Mr. E. J. Balkwell in the years 1936 to 1938. Similarly, Mr. William Moore, keeper of the Southey Shoals Lighthouse kindly took records. Messrs. R. W. Sheppard, C. B. Hutchings, R. P. Gorham, G. H. Hammond, S. D. Hicks, G. Wishart, I. E. Thomas, A. Wilkes, and J. M. Barclay of the Dominion Department of Agriculture and also Rev. H. Millar, Prof. R. W. Thompson, Dr. H. B. Hitchcock and Messrs. J. Foy, E. W. Beck, C. M. Anderson, G. L. Nutt and C. H. Hand have contributed observations.

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NOTES AND OBSERVATIONS

The Turkey Vulture in New Brunswick.—The Turkey Vulture (*Carthartes aura*) has been considered an accidental visitor to New Brunswick since it was recorded only eight times before 1900, the earliest record being in 1875. So far as I know there have been no records published of its occurrence in the Province since 1900, so I believe it worth while to give two more recent records.

Four turkey vultures were seen flying over Scotch Lake, York County, New Brunswick, on May 3, 1924, by W. H. Moore, and reported to the Biological Survey, Washington, D.C., with his detailed migration records.

An adult turkey vulture was caught in a pole trap on June 16, 1940, near Allendale, York County, New Brunswick, by Robert Low. Being unfamiliar with the bird he showed it to John Neil who took it to the Normal School in Fredericton, New Brunswick, for identification. The bird was added to the study skin collection of this school, where I was enabled to confirm the identification on June 21, 1940.—Harold S. Peters.

American Rough-legged Hawk, a victim of its prey.—I have just examined five marsh shrews taken from the crop of an American Rough-legged Hawk. These had evidently caused the death of the hawk by eating through the crop and cutting blood vessels that lead to the bleeding to death. Tom Johnston, a young taxidermist, found this hawk bleeding to death on the highway

near Oak Point, Manitoba, and as it was still warm, he opened it at once and found the five marsh shrews, one or more of which must have been alive to have eaten through the crop and the blood vessels, and evidently caused the death of the hawk. This is a new role of the shrew, as very few birds or animals will touch them, but evidently the young American hawk did not make distinction between shrews and mice and bolted five before realizing the difference. The fact that it was a young hawk may help explain, for cats invariably leave shrews on the back door step, and most of the specimens sent in have been left this way. It would be interesting to know how often young hawks make this mistake. The taming of the shrew is too much for them.—V. W. JACKSON.

RAIN OF DUCKS AT FOAM LAKE, SASKATCHEWAN.—I am indebted to Dr. Chant of Foam Lake, Saskatchewan, for a description of a remarkable "fall of ducks" that took place there on the night of November 5th, 1940. Residents of Foam Lake were disturbed by a strange noise that could be heard plainly in the houses. When they rushed out they found that the noise was caused by a great migration of birds, and some had the unpleasant experience of receiving a Butterball duck right on the head. The night was very foggy and nothing could be seen of the birds passing overhead, but hundreds of them were dropping out of the sky, some with badly damaged wings. Others had their heads almost severed from their bodies, no doubt from contact with telephone wires or other obstacles, while others were uninjured.

The flight lasted from 9.30 p.m. to 2.00 a.m., and it is estimated that four or five hundred ducks were picked up. All were Buffleheads (*Charitonetta albeola*). Birds were picked up at Elfros, 18 miles west, and Sheo, 18 miles east of Foam Lake. Dr. Chant states that some of the birds were kept for a few days but they could not or would not take flight again. The original flight was from north-west to south-east.

The following additional facts, ascertained from Dr. Chant, are of interest: There was a heavy fog on the night in question, but there was no snow on the ground. There were no authentic observations of ice on the plumage of the birds forced down. Ducks examined were exceedingly fat. Both male and female birds were seen, and although there is no evidence that the whole flight was made up of Buffleheads they were the only species to come down. The birds were apparently weakened by a long flight and confused by the town lights. Two birds were released on water the next morning, but would not take off.—H. S. SWALLOW.

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Museum of Comparative Zoology
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FRANK THOMAS SHUTT

1859 - 1940

It is over fifty years ago that Dr. Shutt (called in those days Professor Shutt from having been a member of the staff of Toronto University) became a member of the Field-Naturalists' Club. I remember him as a familiar figure at the Club outings in a group of distinguished men: Dr. R. W. Ells, Dr. Ami, R. B. Whyte, Andrew Halkett, Dr. J. Fletcher, W. D. LeSueur, the Macouns—father and son, and others. "All, all are gone, the old familiar faces." On many walks with Dr. Shutt in his later years I remarked the traces of his association with the Field-Naturalists' Club in his fondness for giving the botanical name to common wild flowers and grasses.

Dr. Shutt was more than a nominal member of the Club. He participated in its activities, served on its committees, went through its offices, and for two years was president, 1895-1897. Moreover he contributed many articles to the *Field-Naturalist*, particularly in the nineties, one among them being particularly appropriate to club outings, "On the Poison of Poison Ivy".

Dr. Shutt was born in London, England. While he was still a small boy his father came with his family to Canada and settled at Toronto. There the young man studied chemistry under the late Dr. Ellis and graduated B.A. with honours at Toronto University. In 1887 he was appointed chemist to the newly-established Experimental Farm. Here for forty-six years he rendered distinguished service to scientific agriculture. Some branches of the subject to which he made notable contributions are nitrogen research in grass and hay production, the value of clovers and legumes for the upbuilding of soil fertility, and the general question of soil analysis and fertilizers. Moreover he rendered important assistance to plant and grain researchers by establishing through chemical analysis standards of value. His reports on these and other results are models of lucidity and good English.

The value of his work did not go without recognition. In 1912 he was appointed Assistant Director of the Dominion Experimental Farms. Two years later his *Alma Mater* conferred on him the degree of D.Sc. *honoris causa*. The Royal Society of Canada awarded him the Flavelle gold medal for his contributions to science. In 1929 the American Society of Agronomy presented him with a valuable prize in recognition of the value of his researches to grazing and pasture management. In 1935 his name appeared in the Honours list as a Commander of the Order of the British Empire.

Apart from his professional duties Dr. Shutt's life was enriched by a number of keen interests. From his youth he loved music, and as a young man he made considerable progress in studying the organ. In Ottawa he acted at different times as organist for Anglican churches, and over a quarter of a century ago took a prominent part in choral societies. In later years he derived much pleasure from good gramophone records as well as from the better broadcasts of music. For nearly fifty years he was a devotee of photography and a skilled and artistic worker. Some of his pictures, especially in the more difficult printing processes, were of a very high order. He was a leading member of the old Art Photographic Club (of Ottawa), and his offerings at its annual exhibition were always notable. To the end of his life he retained his enthusiasm for photography, and a new type of camera or an exhibition of prints was sure to attract him.

He was a faithful member of the Church of England, a high churchman in so far as he liked the service with full ritual and laid stress on appropriate music. Refined and even fastidious in his tastes, and graced with a delightful old-

fashioned courtesy, he has been missed as one of the best types of the fast disappearing class, gentlemen of the old school.—W.J.S.

Papers under the following titles were published by Dr. F. T. Shutt in the official organ of the Ottawa Field-Naturalists Club.

1891—The chemistry of food. *Ottawa Field-Naturalist,* 5: 143-160.
1893—Notes on six lectures delivered by Robt. Warington, F.R.S., on the agricultural investigations at Rothamsted, England. 6: 89-96.
1893—The air of our houses. 7: 24-32.
1893—Chemical analysis of Manitoba soil. 7: 94-96.
1895—The relation of the atmosphere to agriculture. 9: 12-14.
1896—Hermann Hellriegel. 10: 16.
1896—Chemical work in Canadian agriculture. 10: 29-43.
1896—Soil inoculation by nitrogen. 10: 136-138.
1897—On the composition of Canadian virgin soils (abstract). 11: 102-103.
1897—The late Professor Georges Ville. 11: 26-27.
1897—The poison of poison ivy. 11: 106-108.
1898—Liquid hydrogen. 12: 85-86.
1899—The water of the Illecilliwaet Glacier. 12: 226-228.
1900—Soils and the maintenance of their fertility through the growth of legumes. 14: 37-48, 57-69.
1904—Note on the food value of certain mushrooms. 18: 87-88.
1904—Nature study and the camera. 18: 161-164.
1905—On the food value of certain mushrooms. 19: 43-47.
1907—Rain and snow. 21: 169-175.
1911—The fertilizing value of rain and snow. 25: 99-100.
1911—Drinking water and health. 25: 168-171, 175-181.
1933—Wm. T. Macoun—An appreciation. *Canadian Field-Naturalist.* 67: 161-162.
1935—Alfred G. Kingston. 69: 63.

NOTES ON HOMING AND HIBERNATION IN Eptesicus fuscus

By KEITH REYNOLDS

IN THE COURSE of banding bats as an aid in studying their habits an opportunity of determining whether young bats can find their way back to the roost if liberated at some distance presented itself during the summer of 1940.

In a colony of Big Brown Bats, *Eptesicus f. fuscus,* located in the attic of a farmhouse one mile north of Delaware, Middlesex County, Ontario, 98 bats were captured on August 7. As each was banded its age and sex were recorded. The adults and bats of questionable age were placed in cages separate from the young of the year. The 63 young bats (36 males and 27 females) were liberated at the University of Western Ontario, London, at 11.00 p.m., August 7, 10.2 miles from the point of capture. In order to eliminate the possibility that these young bats would be able to follow some of the adults back to the roost, the adults were not liberated until 2.00 p.m. on August 8, at a point 1.2 miles from the University.

On the afternoon of August 15 the colony was again visited and two of the young (both males) were retaken, together with 8 of the adult females and 28 unbanded bats. On this occasion many of the bats present in the colony were in places inaccessible to the collectors.

Since the two males retaken were young of the year, it seems improbable that they had already familiarized themselves with the territory where they were released. The results suggest that young male bats of this species possess the ability to home, for short distances at least, unaccompanied by adults. The ability of young bats to home when released with adults has been reported for the Little Brown Bat, *Myotis l. lucifugus,* by Hitchcock and Reynolds (1941).

The recovery on January 22, 1941 of one of the adult female bats in the cellar of a building at Mt. Brydges—only 3.5 miles from the summer roost—is in agreement with evidence obtained by others that this species does not make long migrations. Griffin (1940, p. 238) reports the summer recovery of an *Eptesicus* in Connecticut 10 miles from the cave in which it was found hibernating. Hitchcock (unpublished) reports the winter recovery of a bat of this species in Connecticut about 10 miles from the summer colony where it had been banded. In southern Ontario *Eptesicus* is often found during the winter in private homes, churches, and other buildings affording protection from extremely low temperatures.

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THE MONARCH BUTTERFLY, *Danaus archippus* Fab. II. THE MOVEMENT IN SOUTHERN ONTARIO *

By GEOFFREY BEALL
Dominion Entomological Laboratory, Chatham, Ontario

1. Introductory

THE WRITER, Beall (1941), has dealt with general observations on the migration of the monarch butterfly, *Danaus archippus* Fab., made, from August 1934 to the end of 1940, in southern Ontario. The present discussion is based on the same observations, but is restricted to notes made on the direction of the flight of monarchs. This material was studied from two points of view, first, of detecting migration and, second, of observing the effect of wind upon flight.

2. Movement on a Day of Manifest Migration

When the monarch is abundant the migration in autumn becomes manifest, first, in spectacular flights near the Great Lakes and, second, in a steady stream of butterflies across the country generally; we propose to present an illustration of the count made at such a time on the second aspect as an illustration of the phenomenon and as an illustration of a type of analysis which we have used extensively. The monarch was, as has been discussed by Beall (1941), abundant in 1934 and September 13 was a day of the type under discussion. Many monarchs were seen during a 2-hour drive about the farming country remote from the lakes and of these the direction of the flight of 40 was decided to the satisfaction of the observer. The 40 observations are summarized in Figure 1, where the number of monarchs seen flying in a given direction is indicated by the length of a radial line and the 8 major points of the compass are represented in the conventional way. The direction of the wind is indicated by an arrow. The scale is indicated by the line which represents 5 monarchs flying to the southwest. Presumably, the behaviour on this day would be termed by our standard work, that of Williams (1930), unidirectional flight to the south, which was not deflected by a moderate west wind blowing at the time.

In the case of the observations presented in Figure 1, there can be no doubt of the trend of flight, but often the movement is not so clear-cut and it is desirable to determine the trend in some objective way. Such a determination may be made, as the net movement, if the number of monarchs given with reference to the 8 major points of the compass be regarded as 8 vector quantities, by the summation of vectors, *i.e.*, by the determination of the resultant. Thus on September 13, the count was as follows: 2 N, 2 NW, 5 SW, 19 S, 7 SE, 3 E and 2 NE; the resultant or net movement was 25.9 a little East of South. Since, however, the total number of

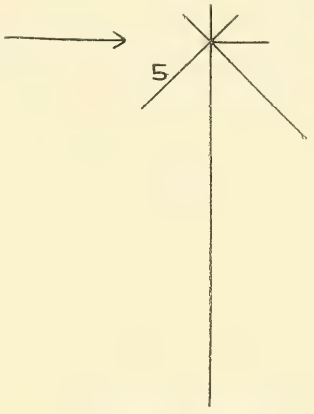

Figure 1. A summarization of the direction of the flight of monarchs on September 13, 1934.

monarchs moving in all directions must influence the number involved in the net movement, there may be calculated what we shall term the relative net movement, *i.e.*, the ratio of the number of monarchs in the net movement to the total number of monarchs. For instance, the total number of monarchs involved in the rose of September 13 was 40, the magnitude of the net movement was 25.9, hence the net relative movement during the period was .65, a little east of south.

3. The Trend of the Movement of Monarchs Overland

On very few days were monarchs seen, away from the Great Lakes, in the numbers discussed in section 2, but from the pooling of many smaller observations, a considerable body of data has been assembled. The direction of flight of some 2000 monarchs were so reported in observations, most of which dealt with a single monarch and only two dealt with a flight so great as that concerned in Figure 1, during the years 1935 to 1940 by entomologists in the service of the

* Contribution No. 2113, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada.

Dominion Department of Agriculture. Most of these records were made in Kent county, Ontario, and all were made in southern Ontario between Windsor and Belleville. From these records, some 700 on the movement of monarchs judged to be flying steadily in some direction in the open, through town or over fields and roads but not in glades or on the lakeshore were selected to see if any trend of flight could be detected. The records for the season were broken into parts for which the trend of flight might be anticipated to be fairly homogeneous. The divisions chosen beforehand were: (1) from the beginning of the season until the end of June, (2) July and the first 10 days of August, (3) the two weeks preceding the appearance of aggregations at the Great Lakes on about August 24, (4) the 2 weeks succeeding August 24, and then (5) the remainder of the season. For each of these periods, in 1935, in the 4 succeeding lean years pooled

TABLE 1. A SUMMARIZATION OF THE DIRECTION OF FLIGHT OF MONARCHS OVERLAND IN THE YEARS 1935 to 1940

Direction	Till June 30	July 1—Aug. 10	Aug. 11—Aug. 24	Aug. 25—Sept. 7	After Sept. 7
		1935			
E	0	11	3	3	3
NE	1	10	3	1	4
N	3	22	7	12	8
NW	1	10	5	0	14
W	8	24	3	6	9
SW	0	4	12	2	2
S	2	14	25	24	3
SE	0	6	7	10	10
Net direction	WNW	NW	S	S	NW
		1936-1939 (inclusive)			
E	2	4	1	5	5
NE	1	3	0	5	0
N	7	9	3	1	1
NW	2	6	1	0	1
W	5	15	4	5	5
SW	5	1	2	0	3
S	1	6	7	5	11
SE	2	8	1	6	1
Net direction	WNW	WNW	SW	ESE	S
		1940			
E	0	3	7	2	8
NE	0	2	2	0	1
N	0	6	2	0	32
NW	1	1	1	0	11
W	0	7	5	4	67
SW	0	2	1	2	18
S	0	3	2	11	86
SE	0	1	0	0	10
Net direction	NW	NW	NE	SSW	SW
		All Years			
Net direction	WNW	NW	SSW	SSE	SW
Net magnitude	15.8	31.8	30.7	37.7	107.1
Relative net magnitude	.39	.18	.29	.36	.34

and in 1940, the number of monarchs flying in each of the 8 major directions is given in Table 1. For each subdivision of the data the net direction of the net movement is indicated to the nearest of the 16 major points of the compass. For each period over all 6 years, the net magnitude of the net movement, the net direction and the relative net magnitude of the relative net movement are shown. In figure 2, the relative net movement for each period over all years has been presented diagrammatically. The scale is indicated by the relative net magnitude, .34, of the last period; the directions are taken for granted in the conventional way.

Since, as is discussed in the appendix, the relative net magnitudes shown in Table 1 and Figure 2 are probably statistically significant, some confidence can be placed in the significance of the net direction.

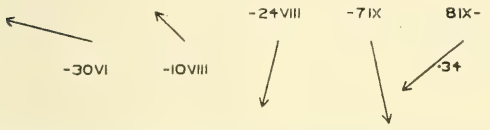

Figure 2. The relative net movement of the monarch butterfly during 5 periods over the years, 1935 to 1940.

From the relative net movement shown in Figure 2, northerly flight predominated during the first 2 periods (until August 10) and southerly during the last 3 periods. These data provide clear evidence of a northerly flight, in the early season, which is carried out by small numbers of scattered butterflies; such evidence has been generally lacking, although Williams (1938) has presented some observations on the point. It had not been anticipated, as appears to be the case, that the relative net magnitude of the northerly effect would be as marked during June as the obvious, on account of the numbers involved, southerly effect in the autumn. The southerly movement during the third period (August 11 to August 24) was likewise not obvious to casual observation, and was not anticipated. There appeared also an unexpected general tendency to move to the west, which tendency was particularly marked in the spring. It would be useful if the biological significance of this tendency could be traced by similar observations in adjacent regions. The unanimity of these movements may be gauged by noting that although the relative net magnitude was probably significant, the largest value was .39 in contrast to the value of .65 previously found for the movement of September 13, 1934, as pictured in Figure 1.

During 1937 and 1938, the keeper of the Southey Shoals Lighthouse, 7 miles off Pt. Pelee in Lake Erie, made observations on

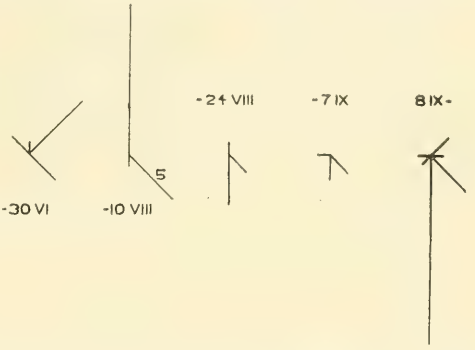

Figure 3. Summarization of the direction of the flight of monarchs by the Southey Shoals Lighthouse in 1937 and 1938.

the direction of the flight of monarchs over the water. For these observations, broken into periods used in Table 1, the net effects were not found but the records are summarized in Figure 3, with the conventions used in Figure 1. The scale is indicated by the line representing 5 monarchs flying southeast. The data of Figure 3 indicate, like those of Figure 2, a tendency to fly to the north during the first two periods and to the south in the subsequent periods.

4. The Relationship Between Wind And The Direction Of Movement

From the observations summarized in Table 1 and other observations in the vicinity of the Great Lakes, those in which the direction of the wind had been noted, were studied further in order to see how the movement of the monarchs was related to the direction of the wind. All the observations for movement over land were revolved, so that the wind always comes from one quarter as indicated by an arrow, and superimposed to give Figure 4. The scale is indicated

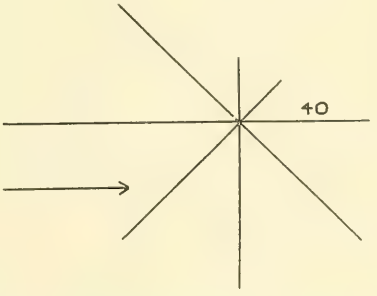

Figure 4. Summarization of the direction of the flight of monarchs with respect to the direction of the wind, overland, 1935-1938.

by the line which represents 40 monarchs flying with the wind. There is a slight preponderance of cases where the butterflies moved into the wind, but an equal and curious preponderance of cases in which they moved with their right wing into the wind. We are inclined to dismiss these effects by supposing them to be due to the coincidence of movement in the autumn predominantly to the south or west and winds during that period predominantly from the west. Apparently there was no marked tendency for the monarchs to move either with or into the wind. Generally, the monarchs were not so passive as was suggested by Felt (1928 & 1938) who seems to have been of the opinion that insects generally, including the monarch, are distributed largely in an involuntary fashion. The foregoing conclusion is further supported by the observations of Beall (1941) on the flight of monarchs

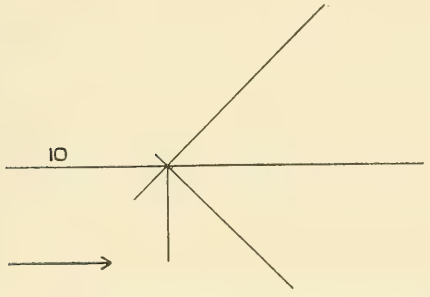

Figure 5. Summarization of the direction of the flight of monarchs with respect to the direction of the wind from data of the Southey Shoals Lighthouse, 1937 and 1938.

out over Lake Erie, which was made most happily into the wind.

The data, previously summarized in Figure 3, on the movement of monarchs over Lake Erie for the years, 1937 and 1938, at the Southey Shoals Lighthouse have been summarized in Figure 5, which is constructed on the same principles as Figure 4, with respect to the relationship of wind to the direction of flight. There is a suggestion that the monarchs moved before the wind; perhaps they did so on account of the high winds that occur over a lake, or on account of fatigue such as is discussed by Beall who shows that monarchs starting out over the lakes from the shore, flew either with or against the wind.

5. SUMMARY

By pooling records on flight collected over long periods there was found to be a definite northerly movement in the spring and a southerly movement which became pronounced in the late summer. These migrations were imperceptible to casual observation, on account of the small number of butterflies involved at any one time. Generally there appeared an unexpectedly westerly trend in movement, which was particularly marked in the spring, and of which the biological meaning is obscure. The movement generally during the autumn did not appear to be so unanimously to the south as on a day of high migration. The monarchs moved either irrespective of the wind or into it when over land, but possibly with the wind when well over Lake Erie.

6. ACKNOWLEDGEMENTS

The present study was suggested to the writer by Dr. C. B. Williams. Especial acknowledgements are due Mr. H. G. James of the Dominion Parasite Laboratory at Belleville, Ontario, to whom many records in that region are due. Continuous and valuable observations have been reported by the staff, Dr. G. M. Stirrett and Messrs. D. A. Arnott, W. E. Lindsay, H. B. Wressell, A. A. Wood and G. E. Coppel of the Dominion Entomological Laboratory at Chatham. Valuable records were made by Mr. William More, keeper of the Southey Shoals Lighthouse. Messrs. R. W. Sheppard, S. D. Hicks, J. Foy, Dr. C. C. Bell and the late J. H. Smith also contributed observations. Messrs. G. A. McCubbin and R. D. Mess most kindly did the photographic work for the illustrations of this paper.

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APPENDIX

It may be objected that the relative net movements shown in Figure 2 are possibly only random effects and we must admit that we do not know the chance distribution of such quantities. We can, however, find some indications of the behaviour of these quantities by sampling from an artificial population. With this purpose in mind,

we made 40 random drawings of the 8 major points of the compass, to correspond to observations on 40 butterflies moving randomly and calculated the net magnitude of their movement. Of 20 relative net magnitudes obtained in this way, the highest was .311. When the latter value is contrasted with the observation of .39 in the first period of Table 1, which was based on 41 observations, we feel that result to have been probably significant. Calculating from random combinations of these 20 groups of 40 observations into 5 groups of 160, we found the highest relative net magnitude to be .088, which value should be contrasted with the results of the second period, *i.e.*, a relative net movement of .18 based on 178 observations. From this comparison, it appears probable that the result of the second period was also significant. The significance of the results in the remaining 3 periods of Figure 2 is hardly in doubt, since the numbers of monarchs involved were greater than 40 and the relative net movement was of magnitude .3 or more.

NOTES AND OBSERVATIONS

THE MOUNTAIN PLOVER IN WESTERN CANADA.—In June, 1939, I saw a solitary example of the Mountain Plover (*Eupoda Montana*) about two miles north of Bracken, Saskatchewan. This established the first record for Canada. It was considered unfortunate at the time that the bird could not be collected to give strength to an occurrence of this nature, but the record was nevertheless published in the Wilson Bulletin, Vol. 51, No. 3, p. 184, 1939, and in the Canadian Resources Bulletin No. 121, July 29, 1939.

It is now a pleasure to report that I have recently been able to substantiate the occurrence of the species in Western Canada by collecting two male specimens (No's 4404 and 4405)—the first for the Dominion, as it is also the initial record for Alberta. They were taken on June 22, 1941, on the shortgrass plains in Section 33, Township 1, Range 3, West of the Fourth Meridian, about six miles north-northeast of Wildhorse, Alberta; this point is approximately five miles north of the International Boundary. Four of these plovers, in all, were seen in company. In consideration of the date, it seems practically certain that they were nesting at this place. A search was made for nests and eggs, or young, but without result. Behaviour of the birds particularly indicated breeding as they were quite agitated and, with excited calls, flew away in various directions when followed, only to invariably return to the point where first observed.

In general character the locality partakes of both the semi-arid Transition and Upper Sonoran Zones. The terrain is flat to gently rolling with an average elevation of about 3,000 feet above sea-level; it forms part of the high plains between Milk River and Lodge Creek on the Missouri drainage. Grass is short and sparse, interspersed with small, naked areas of clay having an arid, desolate appearance. Typical vegetation includes sagebrush (*Artemisia*), greasewood (*Sarcobatus*), the two cacti, *Opuntia* and *Mamillaria*, and occasional low thickets of wild rose (*Rosa*) and snowberry (*Symphoricarpos*). In such an environment, Mountain Plovers are readily detected at a distance when their white breasts are turned toward the observer, but when reversed, blend remarkably well with the brown grasses and earth tints of the Great Plains.—J. DEWEY SOPER.

RED-BREASTED MERGANSER BREEDING ON LAKE NIPISSING.—A downy young merganser in the collection of the Royal Ontario Museum of Zoology, taken by A. L. Tester on Goose Island, Lake Nipissing, on July 12, 1930, and recorded by us (1) as *Mergus merganser*, the Common Merganser, has been discovered to be a Red-breasted Merganser, *Mergus serrator*. This discovery was made by Mr. T. M. Shortt, of the Royal Ontario Museum of Zoology staff, in the course of a critical examination of young mergansers in the collection. Besides establishing *M. serrator* as a breeding bird on Lake Nipissing it also casts doubt on the identity of two nests observed on the Goose Islands in the previous year. It also confirms an earlier record of Thompson (2). There still remains, however, a downy young *M. merganser* from Sandy Island as recorded by us and we are convinced from numerous observations that this species far outnumbers *serrator* as a breeding bird on Lake Nipissing.

As neither of us has ever examined the specimens in question we are indebted to the Royal

(1) Ricker, W. E., and Clarke, C. H. D.—1939—The birds of the vicinity of Lake Nipissing, Ontario: Contributions of the Royal Ont. Mus. of Zool., No. 16.

(2) Thompson, Stuart L., 1922—The birds of North Bay, Ontario, and vicinity in 1904. Can. Field-Nat. 36: 161-168.

Ontario Museum of Zoology and Mr. Shortt for permission to publish this record.—W. E. RICKER and C. H. D. CLARKE.

A CHIPMUNK PURSUES A SNAKE.—The following observation was made on the Moon River about eight miles from Bala, Muskoka District, Ontario, during the second week of September, 1940.

I was on an old fallen tree trunk about six feet above a small strip of sandy beach untangling my fishing line when I heard a rustling and squeaking in the bushes. At the same time a garter snake (*Thamnophis sirtalis*) about twenty-four inches long came out on the beach which was about six feet wide. The snake made for the water at top speed and had almost reached it when a chipmunk (*Tamias striatus*) came out of the bushes in hot pursuit and attempted to catch the snake. The snake reached the water, however, and headed upstream about four or five feet from the shore. The chipmunk followed along the bank squealing and scolding at a great rate. After covering about 15 feet the snake headed out into the river. At this point the chipmunk spied me and scampered off into the bushes still uttering notes of defiance and apparent rage.

McArthur (*Can. Field-Nat.*, vol 47, No. 4) has recorded a similar observation in which the chipmunk actually killed and ate the snake. In this case the snake escaped, but it was obviously afraid of the chipmunk and the latter seemed to be very determined in the pursuit of its quarry.—J. G. PALLISER.

A KITTIWAKE GULL (*Rissa tridactyla*) BANDED NEAR MURMANSK, U.S.S.R., RECOVERED IN NEWFOUNDLAND.—A Kittiwake Gull banded on July 25, 1938, on the Island of Kharlov near the Murmansk sea coast, Barents Sea, U.S.S.R., by a worker of the Central Bureau for Bird Ringing, Moscow, was caught during the Autumn of 1939 in Bonavista Harbour, Newfoundland. The band was marked " M O S K W A 56371 E". This is at least the third Kittiwake banded on the Island of Kharlov that has been recovered in Newfoundland.—HOYES LLOYD.

MOURNING DOVE IN SAGUENAY COUNTY, QUEBEC.—On July 25, 1941, while staying at the summer home of Mr. Johnny Bourque, at the mouth of the Little Watshishu River, about 9 miles east of Baie Johan Beetz, Saguenay County, Quebec, on the north shore of the Gulf of St. Lawrence, I observed a Mourning Dove (*Zenaida macroura*) feeding on the ground near the doorstep and frequenting the vicinity of the chicken-coop. The bird was observed for several minutes in strong light at a distance of about twenty feet and its characteristic form, size, and markings were clearly and carefully noted. Mr. Bourque said that a bird of the same kind was seen acting in the same manner at this place during the summer of 1940.

Records of the Mourning Dove occurring as far north and east as Little Watshishu are not numerous.—T. S. HENNESSY.

NESTING RECORD OF THE UPLAND PLOVER IN THE OTTAWA REGION.—On the afternoon of May 31, 1940, when I was chaining in the second field south of the old C.N.R. right-of-way about a mile and a half east of Cyrville in Lot 21, Con. 2, Ottawa Front, Gloucester Township, Carleton County, a bird flew up suddenly, almost at my feet, and feigned injury on the ground a short distance ahead of me. I recognized it at once as an Upland Plover (*Bartramia longicauda*) from my previous observations of it at Trenton on May 10 and 19, 1940, and realized that it must be trying to lead me away from its nest. Sure enough, on examining the ground ahead, I noticed its small dead grass nest containing three large eggs spotted with brown on a sort of bluish white base. One more pace and I would have stepped right on them. The bird ran about 80 feet ahead and then flew farther up the field to disappear in the grass.

On June 10 and 11, 1940, I revisited the nest and found that it now contained four eggs. So well did the bird harmonize with its surroundings I had difficulty in relocating it. In fact the first day I must have walked very close to the nest without seeing it. Only by taking my bearings from a nearby fence post in which a pair of tree swallows were nesting, and walking in the direction I had noted when I first discovered the nest, was I able to find it again. Even then I couldn't see the bird until, when two feet or so from the nest, it flew up and dangled a short distance away.—E. V. GOODWILL.

BOOK REVIEWS

GEOGRAPHICAL DISTRIBUTION OF THE RECENT MOLLUSCA OF NEWFOUNDLAND,—*Annals of the Carnegie Museum* xxviii: 53-75; 1940: *By Stanley Truman Brooks and Betty Watts Brooks.*

Many years ago a snail, *Helix* (now *Cepaea*) *hortensis* (Mull), a common species of the gardens and woods of England and western Europe was first reported from northeastern North America. Later as it was discovered at other points in the New England States, in Newfoundland and eastern Canada, speculation concerning the origin of such colonies became common among naturalists. Scharff, like certain others, believed the species to be aboriginal with us and used it as a prop for his theory of an Atlantic land bridge. In contrast, other naturalists attributed the origin of the species to commerce, not absolving even the Vikings.

Recently Drs. S. T. and B. W. Brooks of the Carnegie Museum of Pittsburgh have adduced much more evidence bearing on this matter. They found 67 different forms (*i.e.* species and varieties) of land and fresh-water molluscs in Newfoundland. Of this number, 12 are holarctic or circumboreal, 16 are "western European", which includes Greenland and Iceland, in affinity while the remaining 39 are North American. The 16 European species include: *H. hortensis;* 6 slugs of the genera *Arion* and *Limax; Vertigo alpestris;* a single *Succinea* and only two aquatic species, a snail *Radix pereger lacustris* and the well-known pearly mussel *Margaritana margaritifera.* All of these just mentioned occurred predominantly in the eastern part of the island in remote spots rarely touched by man. Accordingly they must be considered native to the region. The western portion of the great island was populated in large measure by molluscs of North American origin.

While the distributional data brought forward in this paper are very striking, their full significance cannot be appreciated at present. Many more similar investigations not only of the recent fauna but also of the Pleistocene are needed in Canada before the time of migration and route of dispersion of the molluscs of Newfoundland, or elsewhere, can be stated. The study of certain other slow-moving animals may yield pertinent evidence. For example the earthworms; Stephenson, in his elaborate monograph of the Oligochaeta, states there are no terrestrial species native to Canada, our known representatives being wholly introduced. However, the findings of the Brooks in the matter of land snails suggest to this reviewer that a search in eastern Newfoundland might yield some evidence of endemic earthworms. To return to the original subject, our authors believe, first, that the inland molluscs reached Newfoundland sometime before the Strait of Belle Isle and Bay of St. Lawrence were formed in the late Pleistocene, and second, that no total or fatal glaciation, especially of eastern Newfoundland, has occurred since that event.

Mr. and Mrs. Brooks are to be congratulated on their valuable and stimulating contribution to the natural history of British North America. —J.O.

BREEDING BIRDS OF THE REGION OF THUNDER BAY, LAKE SUPERIOR, ONTARIO. *By L. S. Dear, Trans. Royal Canadian Inst. No.* 40, *xxiii* 119-143, 1940.

The region north of Lake Superior and from Georgian Bay to the Manitoban line was for long a zoological *terra incognita* from which we had little more than stray scraps of information. Of late years, however, we have had a succession of valuable detailed reports that are gradually filling out the blanks in the picture. The latest is the above covering a critical area near the meeting place of eastern and western influences. It is based upon more or less continuous observations covering thirty years and, though such observations can never be absolutely complete, it presents what is undoubtedly a solid basic breeding list for the locality. It lists 144 species, in most cases well supported by actual nestings or by data upon which they can be confidently assumed. It has every evidence of careful discrimination and accurate observations. The only criticism the reviewer would make is one general to common practice. While trinomials are freely used, except in one or two cases, there is no indication as to whether they are original verifications or the acceptance of conventional assumption. In the one case they would be valuable substantiating or correcting evidence, on the other they are scientifically worthless, merely rubber-stamping concepts that should be under test. However, disregarding the sub-specific presentations this is an important and admirable paper.—P.A.T.

FOLIAGE INSECTS OF SPRUCE IN CANADA. *By A. W. A. Brown, Division of Entomology, Science Service, Department of Agriculture, Ottawa,*

Publication 712, *Technical Bulletin* 31, *pp.* 30, 2 *plates*, 1941.

The information presented in this paper represents a part of the results obtained by the Canadian Forest Insect Survey, a cooperative enterprise between industry, protection services and forest entomologists.

In a very concise way are set down facts and figures on the numbers, food trees, distribution, life history, sex ratio and parasitism of each species, where possible, that feeds upon spruce foliage and also of the insect predators of these species. The numbers and distribution of many adult beetles and true bugs found on spruce are given. Last but by no means least there are valuable keys for the identification of many of the sawfly and lepidopterous larvae and adult bugs, scales and aphids dealt with in the bulletin.

It is a ready-reference work that should be on the desk of every one interested in entomology as it relates to forestry in Canada.—W.C.McG.

GUIDE TO THE FISHES OF THE GREAT LAKES AND TRIBUTARY WATERS. *By Carl L. Hubbs and Karl F. Lagler. Cranbrook Institute of Science, Bloomfield Hills, Michigan.* 1941. *In cloth,* $1.00, *in paper,* 50 *cents.*

There is a dearth of popular literature on the identification, distribution and ecological occurrence of our fishes. The present publication goes a long way towards meeting this need. The senior author, Dr. Carl L. Hubbs of the Museum of Zoology, University of Michigan, is one of the leading ichthyologists of North America so that the information is thoroughly sound and up-to-date. As stated in the introduction the authors have attempted to provide a means by which all persons interested may: (1) learn the characters of importance for the identification of fresh-water fishes and the method by which they may accurately be distinguished; (2) "key" the Great Lakes species to their correct taxonomic designation; (3) become acquainted with their known graphic range, and (4) find an ecological annotation indicating the habitat in which each form most frequently lives. The publication is illustrated with 100 half-tone illustrations of the fishes and 33 other illustrations of characters used in identification. The work deals with 170 species represented by 229 named forms. Of these, 122 species are represented in Ontario. In addition, the fresh-waters of Ontario contain at least one species, the goldeye, *Amphiodon alosoides*, not found in the Great Lakes basin. Another species, *Aphredoderus sayanus*, is incorrectly listed in the Guide as occurring in Ontario. Dr. Hubbs has advised me that the inclusion of South Dakota within the range of this species is also an error.

It cannot be claimed that this guide makes the identification of all fishes easy (the identification of some groups, such as the minnows and whitefishes, requires considerable experience) but it can be stated that it is the most useful publication for the identification of the fishes of the Great Lakes region that has yet appeared.—J.R.D.

A FAUNAL INVESTIGATION OF PRINCE EDWARD COUNTY, ONTARIO. *By L. L. Snyder, E. B. S. Logier, T. B. Kurata, F. A. Urquhart, and J. F. Brimley. University of Toronto Studies, Biological Series, No.* 48, *The University of Toronto Press, Toronto, Canada,* 1941. *Price* $1.00.

This interesting and useful publication is concerned with the animals of an unusual part of Ontario. Prince Edward County is notable for its insular character, for it was naturally almost an island in Lake Ontario and its separation from the mainland has been artifically completed by the digging of a canal across the narrow isthmus that once made it a peninsula. It is also distinguished climatically from the rest of the Province, for it has an annual precipitation of only 28.6 inches and a high summer temperature (a mean of 70° for July). It is interesting to learn that, although agriculture is so highly developed in the county that it is commonly referred to as "Ontario's market garden", there still remain within the county boundary some fairly extensive forested tracts. The combination of conditions thus briefly stated provides a setting for an especially interesting fauna.

The publication under review, which gives an account of the more prominent components of that fauna, consists of seven separate papers, namely:

"General Introduction", by L. L. Snyder;
"The Mammals of Prince Edward County, Ontario", by L. L. Snyder;
"The Birds of Prince Edward County, Ontario", by L. L. Snyder;
"The Amphibians and Reptiles of Prince Edward County, Ontario", by E. B. S. Logier;
"A List of the Spiders of Prince Edward County, Ontario", by T. B. Kurata;
"An Annotated List of the Crickets and Grasshoppers (*Orthoptera Saltatoria*) of Prince Edward County, Ontario", by F. A. Urquhart;
"A List of the Long-horned Beetles (*Cerambycidae*) of Prince Edward County, Ontario", by J. F. Brimley.

The original data on which this account of the

fauna of Prince Edward County is based were obtained in large part by field work carried on in that county by members of the staff of the Royal Ontario Museum of Zoology; in part from the records of naturalists resident in the county, especially W. H. Lunn, Frank Brimley, Dayton Murphy, and Charles Melton; in part from the records of other naturalists who have visited the county from time to time; and in part from previous publications and the records of other museums.

The author himself has called the reviewer's attention to a slight error in the first paragraph of "The Mammals of Prince Edward County, Ontario", where it is stated that thirty-one species are listed in that paper, although the actual number is thirty-two.

It was to be expected, because of the situation and climate of Prince Edward County, that its fauna would be found to contain a number of southern elements that seldom or never occur in the greater part of Ontario. Perhaps the most striking occurrence of a southern form is that of the Anhinga or Water Turkey (*Anhinga anhinga*), a specimen of which was taken near Wellington in the autumn of 1904. There are no other records of this species for Canada.

The account of the Ring-billed Gull (*Larus delawarensis*) refers to this species only as a spring and autumn visitor to Prince Edward County and unfortunately states that "It is not to be expected in summer". Since there is a well-known breeding colony of Ring-billed Gulls on Salmon Island, in Frontenac County, less than 15 miles from the nearest part of Prince Edward County, frequent occurrence of this species in the latter county in summer might have been presumed. The breeding colony of Ring-bills at Salmon Island was recorded in 1932 by the late R. O. Merriman (*Can. Field-Nat.* 46:22) and later by Baillie and Harrington in their publication, "The Distribution of Breeding Birds in Ontario", which is number 8 of the Contributions of the Royal Ontario Museum of Zoology. Unpublished reports indicate discovery of the actual breeding of the Ring-billed Gull in Prince Edward County in 1941.

Concerning the Caspian Tern (*Hydroprogne caspia*) the statement is made that "The only evidence that the species remains in this region to nest is that of the late Rev. C. J. Young who found a nest with one egg of this species in the Common Tern Colony on Gull Bar, June 6, 1917". The term "region", as here used, is presumably equivalent to "Prince Edward County", for the nesting of the Caspian Tern on Salmon Island, Frontenac County, has been published by the late R. O. Merriman and subsequently by Baillie and Harrington. This species also was found in 1941 to be nesting in Prince Edward County.

A slip of the pen is believed to be responsible for the statement on page 65 that the Downy Woodpecker is less common in Prince Edward County than the Hairy Woodpecker, when actually the reverse, as might be expected, is the case.

"A Faunal Investigation of Prince Edward County, Ontario", is a report that will commend itself to workers in natural science, field students, and residents of the area with which it deals. Undoubtedly it will long continue to be the standard reference work in its field.—H.F.L.

ORNITHOLOGICAL LABORATORY NOTEBOOK. *By Arthur A. Allen, Ph.D.; viii* +204 *pp.*, 8x10½, *one coloured map and a number of perforated pages of outline drawings. Comstock Publishing Company Inc., Ithaca, N.Y. Fourth Edition* 1941. $3.00.

The first edition of the Cornell Ornithological Notebook met with a warm welcome from *The Canadian Field-Naturalist* when it appeared. Changes that have been made since have been obviously dictated by experience. The general plan is the same. There are pages for the study of the anatomy and topography of birds, keys to the birds and their nests, pages for field notes, a check list, etc., with many pages for the detailed description of all but the rarest species. The outline drawings for colouring are detached and intended to be pasted in, and some of them will fit several species. The effect of this is to give a book that can be used over a wider area. The completion of a Notebook by a determined student would undoubtedly smooth the path to ornithological knowledge.—C.H.D.C.

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CHRISTMAS BIRD CENSUS.

The Bird Census Committee wishes to remind all persons interested to take a Christmas Bird Census on some day in the period December 20-28, inclusive, and to send a report of it to the Editor as promptly as possible. On account of restricted space available for publication of such reports, Council has, by resolution, expressed the view that these reports should be published only in reduced form, restricted to essential information. The Christmas Bird Census reports published in the February issue of "The Canadian Field-Naturalist" for each of the past four years furnish numerous examples of this form. Contributors of Bird Census reports will save much unnecessary editorial revision if they will submit reports prepared in conformity with this resolution of Council.

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